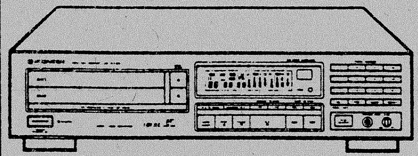
Service Manual

PIONEER
The Art of Entertainment



• The above illustration shows the PD-T507.

ORDER NO.
ARP2201

TWIN–TRAY COMPACT DISK PLAYER

PD-T507
PD-T307

PD–T507 AND PD–T307 HAVE THE FOLLOWING:

Type	Model		Power Requirement	Remarks
	PD–T507	PD–T307		
KC	○	○	AC120V only	
MEM	○	○	AC220V–230V	
UB	○	–	AC230V–240V	
UPW	○	○	AC230V–240V	
SD	○	○	AC110V, 120V–127V, 220V, 240V (switchable)	

- **This manual is applicable to the PD–T507/KC, MEM, UB, PD–T307/KC and MEM types.**
- **As to the PD–T507/MEM, UB and PD–T307/MEM types, refer to page 93–94.**
- **As to the other types, refer to applicable service manuals.**
- **As to the mechanism descriptions, refer to the PD–Z74T service guide (ARP2144).**
- **Ce manuel pour le service comprend les explications de réglage en français.**
- **Este manual de servicio trata del método ajuste escrito en español.**

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1. SAFETY INFORMATION

(FOR EUROPEAN MODEL ONLY)

VARO!
AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.

LASER
Kuva 1
Lasersateilyn varoitusmerkki

ADVERSEL:
USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION UNDGÅ UDSAETTELSE FOR STRÅLING.

VARNING!
OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRAKTA EJ STRÅLEN.

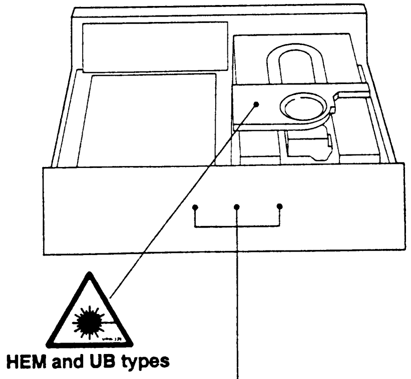
WARNING!
DEVICE INCLUDES LASER DIODE WHICH EMITS INVISIBLE INFRARED RADIATION WHICH IS DANGEROUS TO EYES. THERE IS A WARNING SIGN ACCORDING TO PICTURE 1 INSIDE THE DEVICE CLOSE TO THE LASER DIODE.

LASER
Picture 1
Warning sign for laser radiation

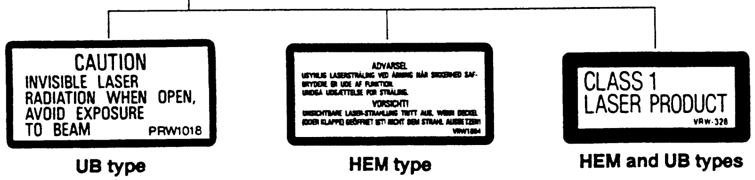
IMPORTANT
THIS PIONEER APPARATUS CONTAINS LASER OF HIGHER CLASS THAN 1. SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUCTED PERSON.

LASER DIODE CHARACTERISTICS
MAXIMUM OUTPUT POWER: 5 mw
WAVELENGTH: 780-785 nm

LABEL CHECK (TWIN type)



HEM and UB types



CAUTION
INVISIBLE LASER RADIATION WHEN OPEN, AVOID EXPOSURE TO BEAM
PRW1018
ADVARSEL
VORSICHT!
CLASS 1
LASER PRODUCT
VRW-328

UB type

HEM type

HEM and UB types

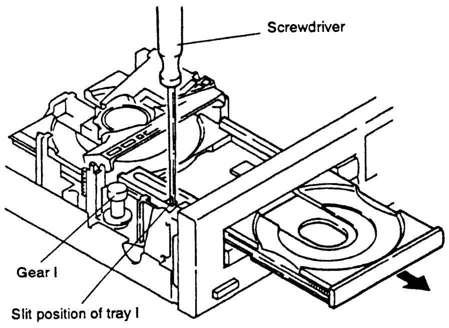
Additional Laser Caution

1. Laser Interlock Mechanism
   The ON/OFF status of the U (S601) and L (S603) switches for detecting the disc clamp state is detected by the system microprocessor, and the design prevents laser diode oscillation when both switches U and L are OFF (high level).
   Thus, the interlock will no longer function if switches U (S601) and L (S603) are deliberately shorted.
   Laser diode oscillation will continue if pins 2 and 3 of CXA1471S (IC101) are connected to ground or pin 20 is connected to high level (ON) or the terminals of Q101 are shorted to each other (fault condition).
2. When the cover is opened, close viewing of the objective lens with the naked eye will cause exposure to a Class 1 or higher laser beam.

2. REMOVING AND MOUNTING OF EACH BLOCK

● REMOVAL OF TRAY I AND TRAY II

1. Open the tray I.
2. Insert the flat blade screwdriver into the slit in the left of tray I. Pull out the tray I by pushing the screwdriver.



* When remove the tray II, open it first, insert the flat blade screwdriver into the slit in the right of tray II, and pull out the tray by pushing the screwdriver.

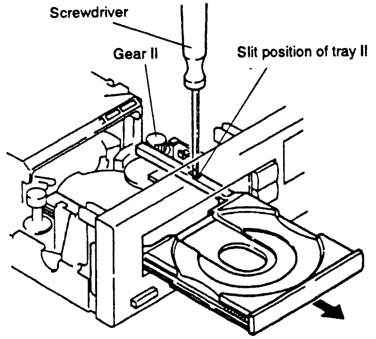


Fig. 1

● MOUNTING OF TRAY I

1. Set the disc II to the clamp position and open the tray I.
2. Align the 1st tooth of tray I to ungrooved portion of gear I, and insert the tray I.

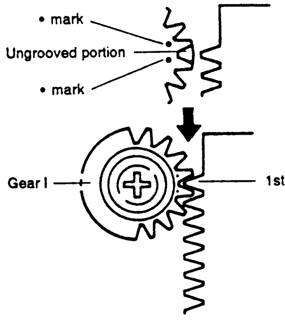


Fig. 2

● MOUNTING OF TRAY II

1. Set the disc I to the clamp position and open the tray II.
2. Align the 1st tooth of tray II to ☐ marked position of gear II, and insert the tray II.

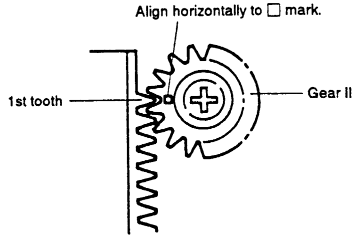


Fig. 3

● MOUNTING AND POSITIONING OF MAIN CAM, FOLLOW GEAR, GEAR I AND GEAR II

Set the following gears to the position as shown by arrows.

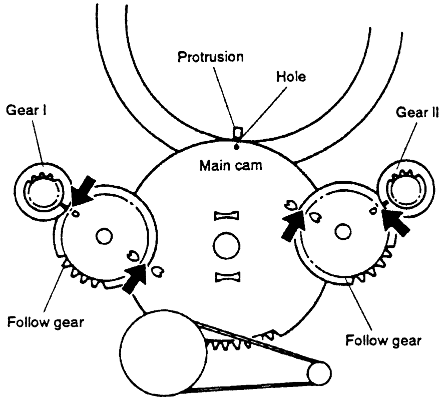

Protrusion
Hole
Gear I
Gear II
Main cam
Follow gear
Follow gear

Fig. 4

● MOUNTING OF CLAMPER ASSEMBLY

Mount the clamper assembly by aligning the protrusion portion as shown in the figure.

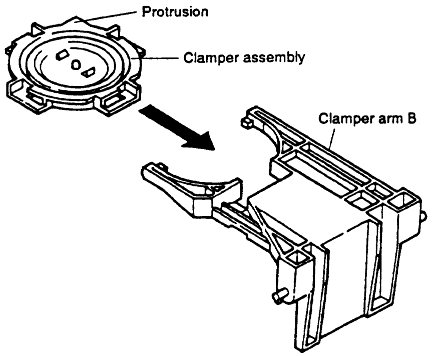

Protrusion
Clamper assembly
Clamper arm B

Fig. 5

● REMOVING THE BONNET

1. Remove six screws to the bonnet.
2. Remove the bonnet by pulling up it in the vertically direction of arrow.
   To easily remove the bonnet, pull outward on both sides of the bonnet then pull it diagonally toward the rear of the unit.

Note: If you pull up the rear base of the bonnet to remove it as in the conventional manner, the hooks shown in Fig. 6 may be caught and the hooks on the front panel side may be deformed.

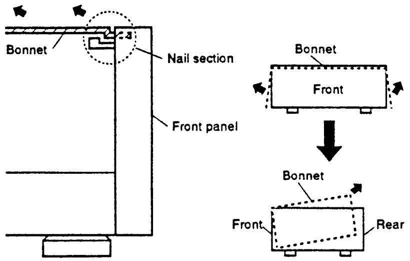
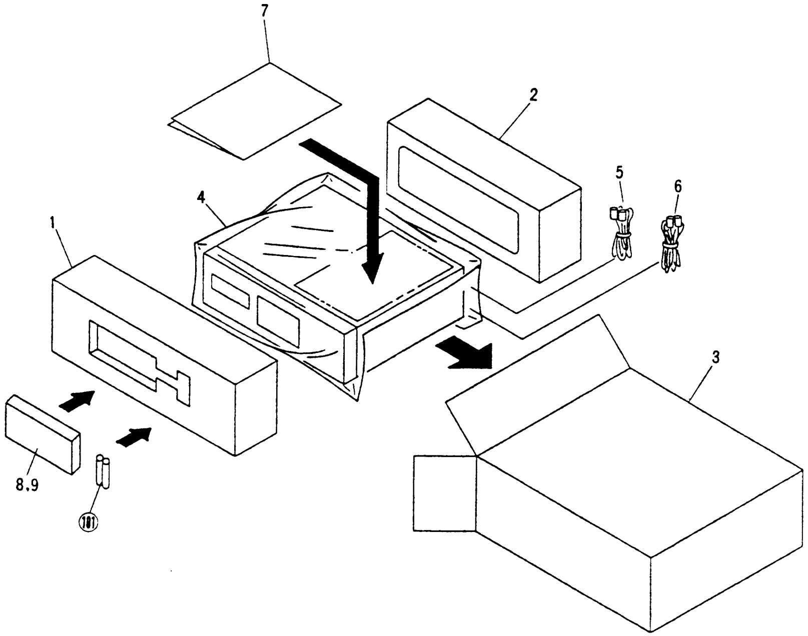

Bonnet
Nail section
Front panel
Bonnet
Front
Bonnet
Front
Rear

Fig. 6

3. PACKING

Parts List (For PD–T507/KC and PD–T307/KC types)

Mark	No.	Description	Part No.
	1	Protector (F)	PHA1116
	2	Protector (R)	PHA1117
	3	Packing case (For PD – T507)	PHG1072
		Packing case (For PD – T307)	PHG1701
	4	Sheet	Z23 – 007
	5	Connection cord (with mini plug)	PDE – 319
	6	Connection cord	PDE1109
	7	Operating instructions (English/French)	PRE1143
	8	Remote control unit (CU – PD047) (For PD – T507)	PWW1062
	9	Battery cover (For PD – T507)	PZN1010
	101	Battery (R03, AAA) (For PD – T507)	


7
2
5
6
4
1
3
8,9
101

4. EXPLODED VIEWS AND PARTS LIST

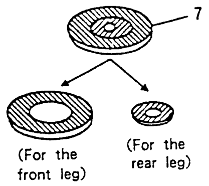
NOTES:
- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

4.1 EXTERIOR

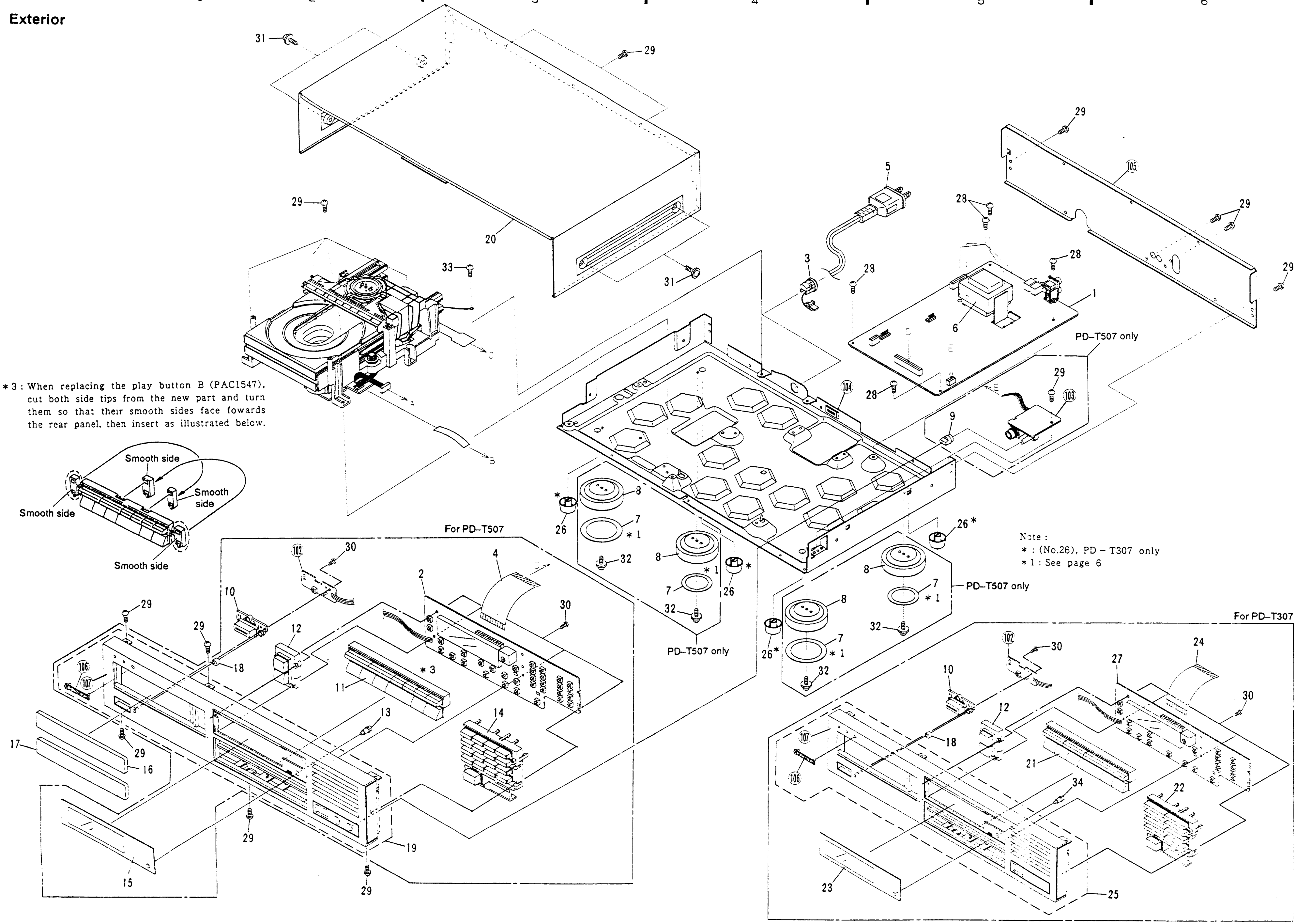
Parts List (For PD–T507/KC and PD–T307/KC types)

Mark	No.	Description	Part No.
⊙	1	Mother board assembly (For PD – T507)	PWM1464
⊙		Mother board assembly (For PD – T307)	PWM1460
⊙	2	Display assembly (For PD – T507)	PWZ2132
⚠	3	Strain relief (For PD – T507)	CM – 22C
⚠		Strain relief (For PD – T307)	CM – 22
	4	31P F.F.C/30V	PDD1074
⚠	5	AC Power cord (For PD – T507)	PDG1015
⚠		AC Power cord (For PD – T307)	PDG1040
⚠	6	Power transformer	PTT1187
	7	Stopper	PNM1070
	8	Insulator	VNK1095
	9	Headphone knob	PAC1370
	10	Power button	PAC1540
	11	Play button (B)	PAC1547
	12	O/C button	PAC1548
	13	Time button (B)	PAC1549
	14	Program button (B)	PAC1594
	15	Display window	PAM1465
	16	Tray name plate (A)	PNW1901
	17	Tray name plate (B)	PNW1902
	18	LED lens	PNW2019
	19	Function panel assembly	PEA1154
	20	Bonnet	PYY1147
	21	Play button (A)	PAC1550
	22	Track button	PAC1579
	23	Display window	PAM1464
	24	29P F.F.C/30V	PDD1075
	25	Function panel assembly	PEA1125
	26	Leg assembly	PXA1201
	27	Display assembly	PWZ2130
	28	Screw	BBZ30P060FMC
	29	Screw	BBZ30P080FZK
	30	Screw	BBZ30P120FMC
	31	Screw	FBT40P080FMC
	32	Screw	IBZ30P080FCC
	33	Screw	PDZ30P050FMC
	34	Time button (A) (For PD – T307)	PAC1546
	101	Sub assembly	
	102	SW assembly	
	103	Headphone assembly	
	104	Under base	
	105	Rear base	
	106	Name plate	
	107	Function panel (B)	

Note :
*1 : The stopper consist of the big ring part and the small ring part.
If you stik the stopper to the leg, stick the big ring part to the front leg, and the small ring part to the rear leg.



Exterior


Smooth side
Smooth side
Smooth side
Smooth side
For PD–T507
For PD–T307
PD–T507 only
PD–T507 only
PD–T507 only
PD–T507 only
1
2
3
4
5
6
7
8
9
10
11
12
13
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15
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19
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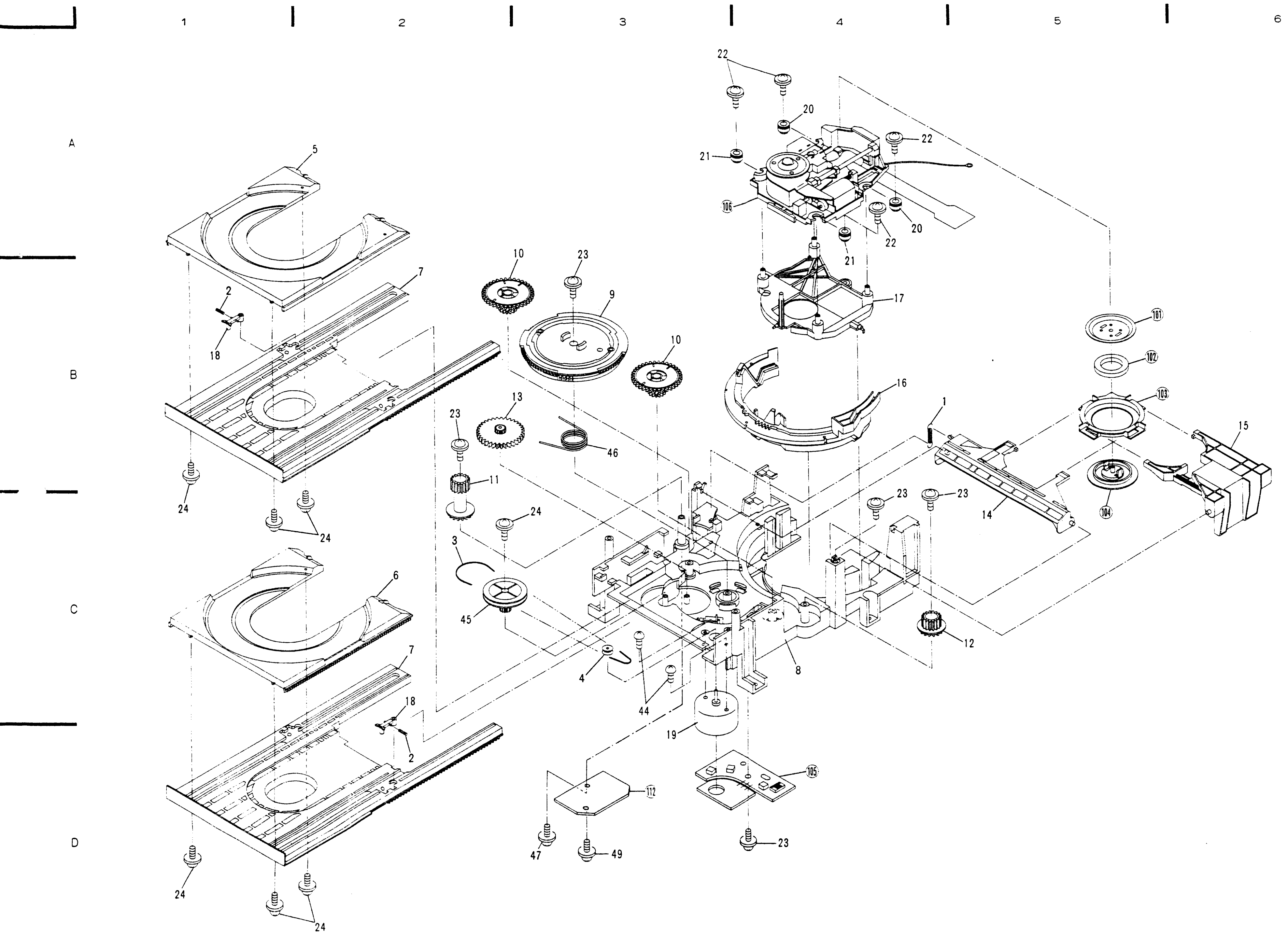
21
22
23
24
25
26
27
28
29
30
31
32
33
34
102
103
104
105
106
107
A
B
C
D
E

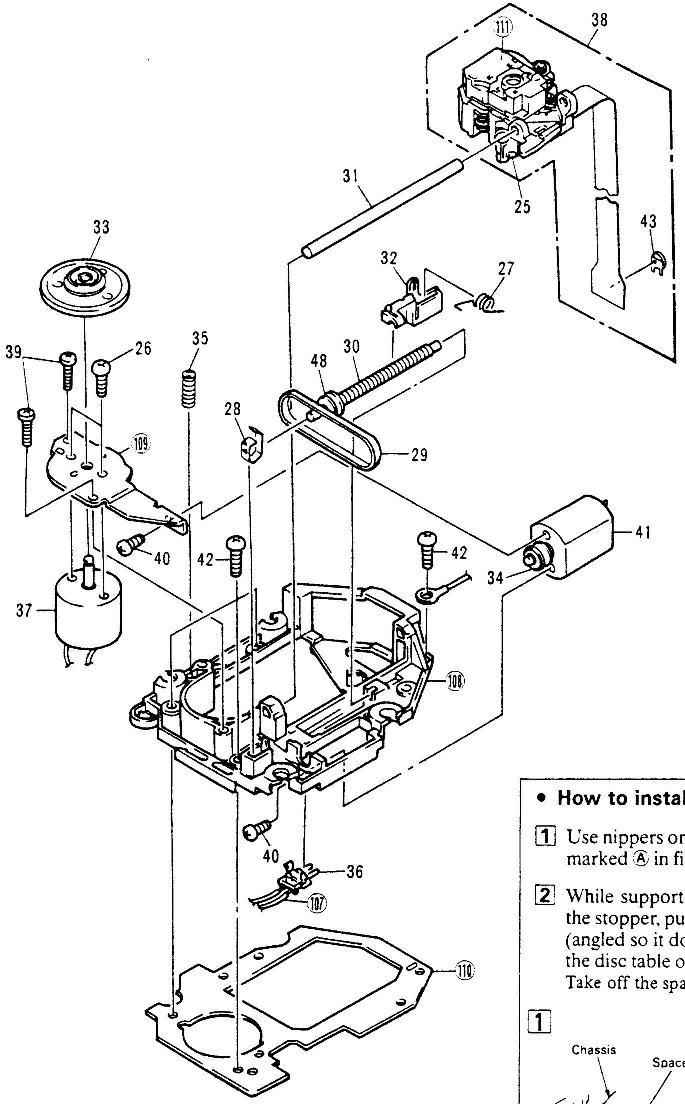
＊3 : When replacing the play button B (PAC1547), cut both side tips from the new part and turn them so that their smooth sides face fowards the rear panel, then insert as illustrated below.

Note :
＊ : (No.26), PD – T307 only
＊1 : See page 6



A
B
C
D

● Servo Mechanism Assembly Section

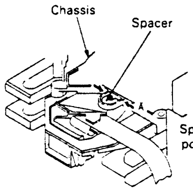

38
111
31
25
43
33
32
27
39
26
35
30
48
28
109
29
41
40
42
42
34
37
108
40
36
107
110

• How to install the disc table

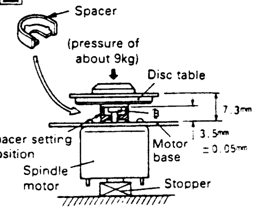
1 Use nippers or other tool to cut the two sections marked Ⓐ in figure 1. Then remove the spacer.

2 While supporting the spindle motor shaft with the stopper, put spacer on top of the motor base (angled so it doesn't touch section Ⓑ), and stick the disc table on top (takes about 9kg pressure). Take off the spacer.

1


Chassis
Spacer
A

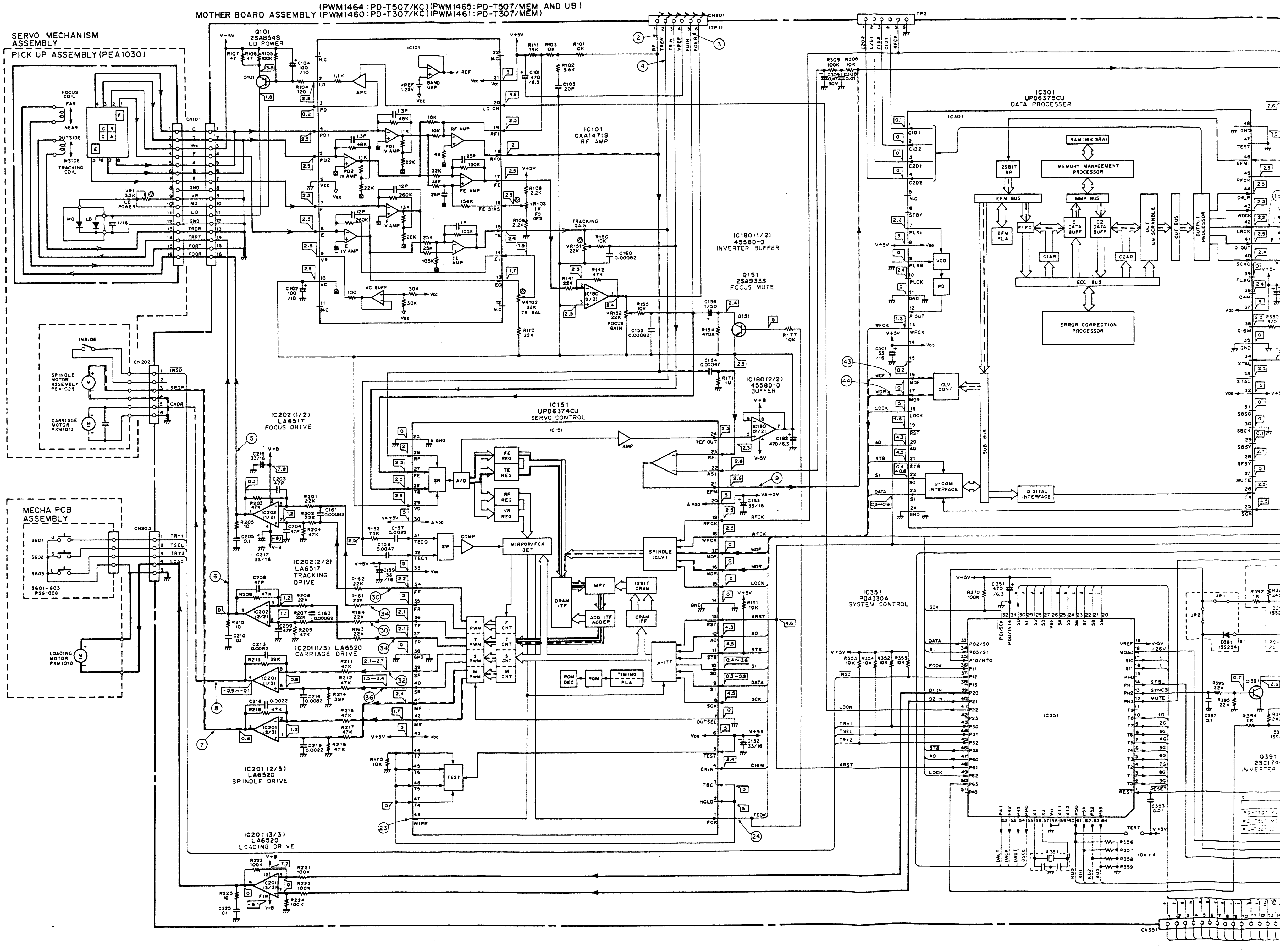
2


Spacer
(pressure of about 9kg)
Disc table
B
7.3mm
3.5mm ±0.05mm
Spacer setting position
Motor base
Spindle motor
Stopper

Parts List of Mechanism Section

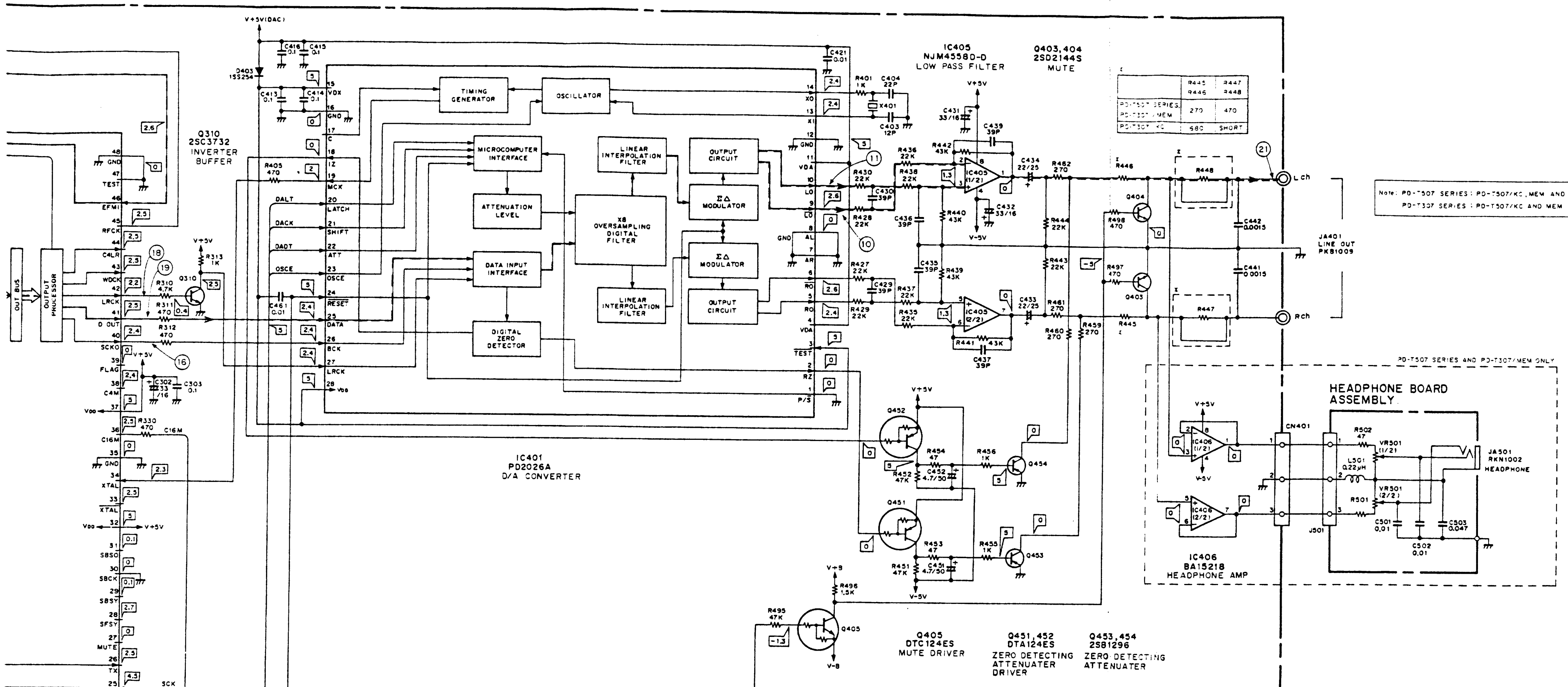
Mark	No.	Description	Part No.
	1	Clamp spring	PBH1103
	2	Lever spring	PBH1104
	3	Belt	PEB1106
	4	Motor pulley	PNW1634
	5	Tray 1	PNW1839
	6	Tray 2	PNW1840
	7	Sub tray	PNW1841
	8	Loading base	PNW1842
	9	Main cam	PNW1843
	10	Follow gear	PNW1844
	11	Gear 1	PNW1845
	12	Gear 2	PNW1846
	13	Idler gear	PNW1847
	14	Clamper arm U	PNW1850
	15	Clamper arm B	PNW1851
	16	Clamp cam	PNW1852
	17	Float base	PNW2041
	18	Lock lever	PNW1854
	19	Motor (LOADING)	PXM1010
	20	Floating rubber	PEB1014
	21	Floating rubber	PEB1132
	22	Screw	PBA1048
	23	Screw	IPZ30P080FMC
	24	Screw	IPZ20P080FMC
	25	Chip capacitor	CKSYF105Z16
	26	Screw	JFZ20P025FMC
	27	Drive spring	PBH1084
	28	Plate spring	PBK1057
	29	Belt	PEB1072
	30	Drive screw	PLA1003
	31	Guide bar	PLA1071
	32	Half nut	PNW1605
	33	Disc table	PNW1608
	34	Pulley	PNW1634
	35	Earth spring	PBH1009
	36	Push switch	DSG1014
	37	Spindle motor assembly (with oil)	PEA1028
	38	Pick – up assembly	PEA1030
	39	Screw	BPZ20P080FZK
	40	Screw	PMZ20P030FMC
	41	Motor (CARRIAGE)	PXM1013
	42	Screw	PBZ30P080FMC
	43	Semi – fixed resistor	PCP1008
	44	Screw	PMZ26P040FMC
	45	Gear pulley	PNW1848
	46	Push spring	PBH1105
	47	Screw	IPZ30P200FMC
	48	Pulley	PNW1066
	49	Screw	IBZ30P120FMC
	101	Yoke	
	102	Magnet	
	103	Clamper holder	
	104	Clamper S	
	105	Mechanism P.C.B assembly	
	106	Servo mechanism assembly	
	107	Connector assembly (6P)	
	108	Mechanism chassis	
	109	Motor base	
	110	Mechanism base	
	111	Actuater cover	
	112	Sub plate	

5. SCHEMATIC DIAGRAM


MOTHER BOARD ASSEMBLY (PWM1464 : PD-T507/KC) (PWM1465 : PD-T507/MEM AND UB)
(PWM1460 : PD-T307/KC) (PWM1461 : PD-T307/MEM)
SERVO MECHANISM ASSEMBLY
PICK UP ASSEMBLY (PEA1030)
FOCUS COIL
TRACKING COIL
Q101 2SA854S LD POWER
IC101 CXA1471S RF AMP
IC180 (1/2) 4558D-D INVERTER BUFFER
IC180 (2/2) 4558D-D BUFFER
Q151 2SA933S FOCUS MUTE
IC151 UPD6374CU SERVO CONTROL
IC202 (1/2) LA6517 FOCUS DRIVE
IC202 (2/2) LA6517 TRACKING DRIVE
IC201 (1/3) LA6520 CARRIAGE DRIVE
IC201 (2/3) LA6520 SPINDLE DRIVE
IC201 (3/3) LA6520 LOADING DRIVE
SPINDLE MOTOR ASSEMBLY PEA1026
CARRIAGE MOTOR PXM1013
MECHA PCB ASSEMBLY
S601-603 PSG1008
LOADING MOTOR PXM1010
IC301 UPD6375CU DATA PROCESSER
IC351 PD4330A SYSTEM CONTROL
Q391 2SC174 INVERTER
CN101 CN201 CN202 CN203 CN351 TP2

IC351 (PD4330A)

Pin No.	Volts	Pin No.	Volts
1	5.0	33	[illegible]
2	−23.0	34	[illegible]
3	−23.0	35	0.0
4	−23.0	36	5.0
5	−23.0	37	5.0
6	−23.0	38	0.0
7	−23.0	39	0.0
8	−23.0	40	0.0
9	−23.0	41	4.9
10	−23.0	42	0.0
11	−26.4	43	0.0
12	5.0	44	5.0
13	5.0	45	5.0
14	0.0	46	5.0
15	0.0	47	4.6
16	−7.3	48	5.0
17	−4.2	49	5.0
18	−26.3	50	0.0
19	−5.0	51	0.0
20	−4.3	52	5.0
21	−10.5	53	5.0
22	[illegible]	54	5.0
23	[illegible]	55	5.0
24	[illegible]	56	2.3
25	[illegible]	57	2.5
26	5.0	58	0.0
27	−16.6	59	0.0
28	[illegible]	60	5.0
29	[illegible]	61	0.0
30	[illegible]	62	0.0
31	0.0	63	0.0
32	4.8	64	0.0


IC401
PD2026A
D/A CONVERTER
IC405
NJM4558D-D
LOW PASS FILTER
Q403,404
2SD2144S
MUTE
Q310
2SC3732
INVERTER BUFFER
Q405
DTC124ES
MUTE DRIVER
Q451,452
DTA124ES
ZERO DETECTING ATTENUATER DRIVER
Q453,454
2SB1296
ZERO DETECTING ATTENUATER
TIMING GENERATOR
OSCILLATOR
MICROCOMPUTER INTERFACE
LINEAR INTERPOLATION FILTER
OUTPUT CIRCUIT
ΣΔ MODULATOR
ATTENUATION LEVEL
X8 OVERSAMPLING DIGITAL FILTER
DATA INPUT INTERFACE
DIGITAL ZERO DETECTOR
OUTPUT PROCESSOR
OUT BUS
JA401
LINE OUT
PKB1009
L ch
R ch
Note: PD-T507 SERIES : PD-T507/KC,MEM AND UB
PD-T307 SERIES : PD-T307/KC AND MEM
HEADPHONE BOARD ASSEMBLY
PD-T507 SERIES AND PD-T307/MEM ONLY
IC406
BA15218
HEADPHONE AMP
JA501
RKN1002
HEADPHONE
V+5V(DAC)

1. RESISTORS :
Indicated in Ω, 1/5W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ±10%, (M) : ±20% tolerance.

2. CAPACITORS :
Indicated in capacity (μF) /voltage (V) unless otherwise noted p : pF.
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE CURRENT :
▭ : DC voltage (V) at play state.
⟵mA : DC current at play state.
Value in ( ) is DC current at stop state.

4. OTHERS :
➡ : Signal route.
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
✱ marked capacitor and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

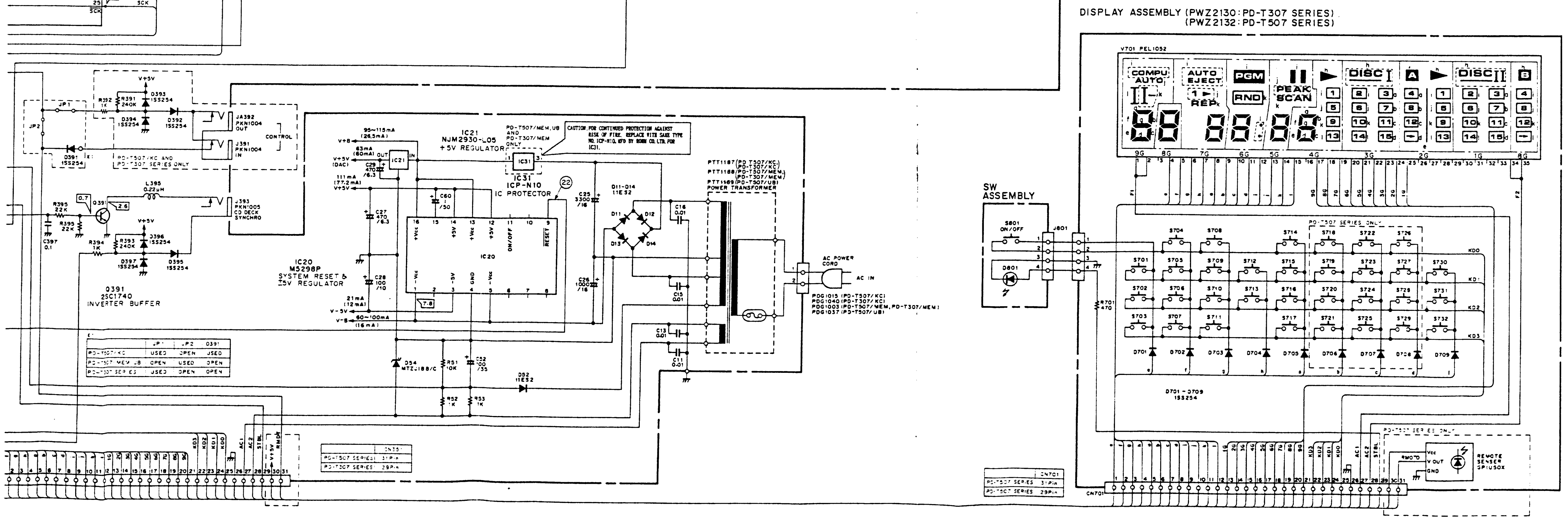
5. SWITCHES (Underline indicates switch position)
DISPLAY ASSEMBLY (For PD – T507 SERIES)
S701 : STOP
S702 : EJECT
S703 : PAUSE
S704 : DISC I O/C
S705 : DISC II O/C
S706 : SCAN
S707 : RND
S708 : PLAY
S709 : DISC II
S710 : DISC I
S711 : PEAK
S712 : ▶▶
S713 : ◀◀
S714 : REP
S715 : CLEAR
S716 : PGM
S717 : EDIT
S718 : 10
S719 : 9
S720 : 8
S721 : 7
S722 : > 20
S723 : 6
S724 : 5
S725 : 4
S726 : + 10
S727 : 3
S728 : 2
S279 : 1
S730 : ▶▶|
S731 : |◀◀
S732 : TIME

SW ASSEMBLY
S801 : POWER ON – OFF

5. SWITCHES (Underline indicates switch position)
DISPLAY ASSEMBLY (For PD – T307 SERIES)
S701 : STOP
S702 : EJECT
S703 : PAUSE
S704 : DISC I O/C
S705 : DISC II O/C
S706 : SCAN
S707 : RND
S708 : PLAY
S709 : DISC II
S710 : DISC I
S711 : PEAK
S712 : ▶▶
S713 : ◀◀
S714 : REP
S715 : CLEAR
S716 : PGM
S717 : EDIT
S730 : ▶▶|
S731 : |◀◀
S732 : TIME

SW ASSEMBLY
S801 : POWER ON – OFF

——— FOCUS SERVO LOOP
- - - - SIGNAL LINE
——— TRACKING SERVO LOOP
- - - - CARRIAGE SERVO LOOP
——— LOADING SERVO LOOP
- - - - SPINDLE SERVO LOOP
➤ MEASUREMENT POINT


DISPLAY ASSEMBLY (PWZ2130 : PD-T307 SERIES)
(PWZ2132 : PD-T507 SERIES)
V701 PEL1052
COMPU AUTO
AUTO EJECT
PGM
RND
PEAK SCAN
REP
DISC I
DISC II
SW ASSEMBLY
S801 ON/OFF
D801
J801
D701 – D709
1SS254
PD-T507 SERIES ONLY
REMOTE SENSOR SPIU50X
CN701
IC21
NJM2930-L05
+5V REGULATOR
IC31
ICP-N10
IC PROTECTOR
CAUTION:FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE WITH SAME TYPE NO. ICP-N10, 6FD BY ROHM CO.LTD.FOR IC31.
IC20
M5298P
SYSTEM RESET & ±5V REGULATOR
Q391
2SC1740
INVERTER BUFFER
JA392 PKN1004 OUT
J391 PKN1004 IN
CONTROL
J393 PKN1005 CD DECK SYNCHRO
PTT1187(PD-T507/KC)
PTT1188(PD-T307/MEM)
PTT1189(PD-T507/UB)
POWER TRANSFORMER
AC POWER CORD
AC IN
PDG1015 (PD-T507/KC)
PDG1040 (PD-T307/KC)
PDG1003 (PD-T507/MEM, PD-T307/MEM)
PDG1037 (PD-T507/UB)
D11-D14
11E32
D54
MTZJ18B/C
PD-T507/KC AND PD-T307 SERIES ONLY

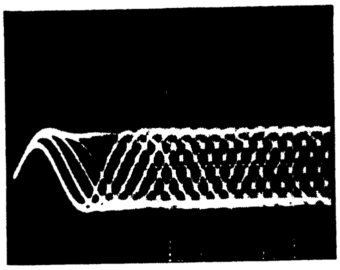
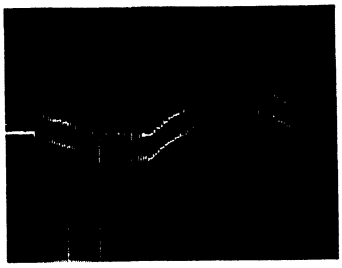
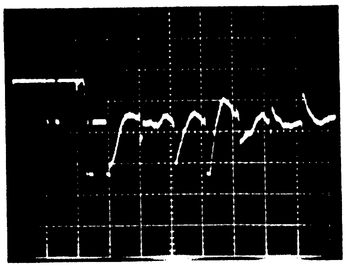
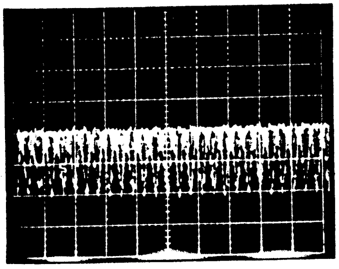
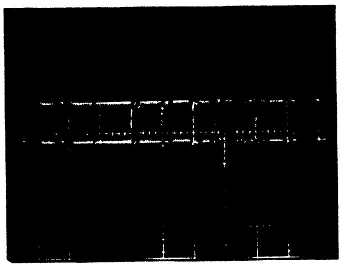
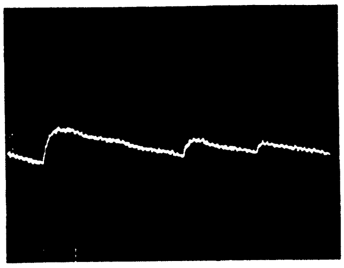
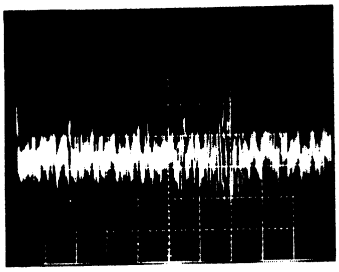
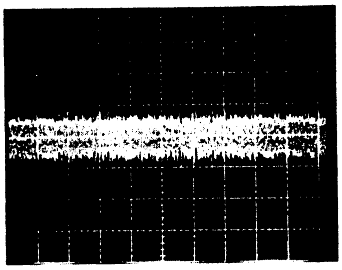
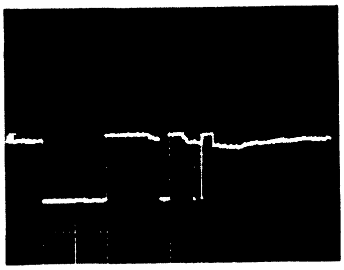
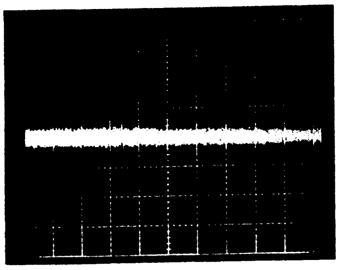
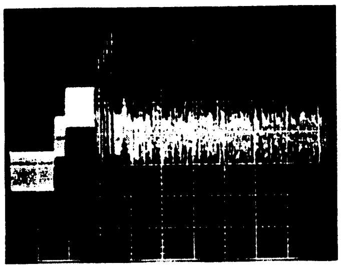
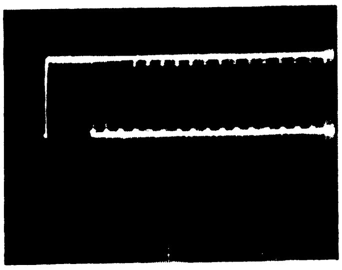
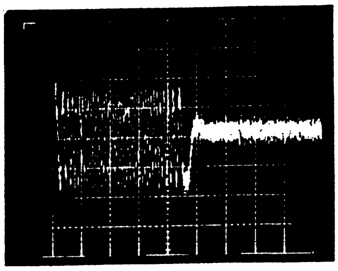
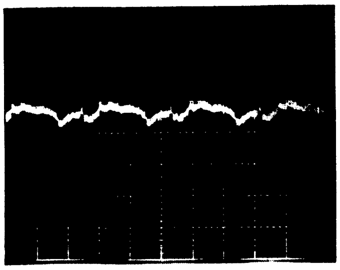
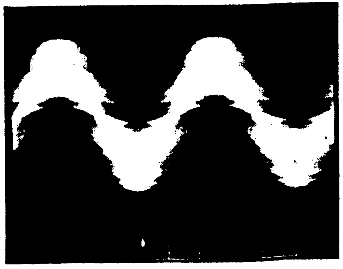
	JP1	JP2	Q391
PD-T507/KC	USED	OPEN	USED
PD-T507/MEM UB	OPEN	USED	OPEN
PD-T307 SERIES	OPEN	OPEN	OPEN

	CN701
PD-T507 SERIES	31Pin
PD-T307 SERIES	29Pin

Waveforms

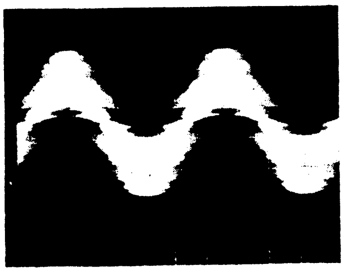
Note: The encircled numbers denote measuring points in the schematic diagram. (V_{REF} = Voltage of TP1-Pin4)

*1 50T-JUMP: After switching to the pause mode, press the manual search key.
*2 FOCUS-IN: Press the key without loading a disc.

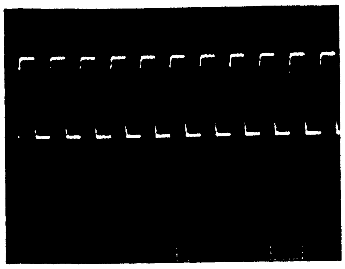
② TP1-Pin 1: PLAY MODE (RF) 500mV/div 500nsec/div  — V_{REF}	⑤ IC202-Pin1: FOCUS-IN (*2) MODE (FODR) 1V/div 200msec/div  — GND	⑦ IC201-Pin 3: TRACK SEARCH MODE (SPDR) 2V/div 50msec/div  — GND
② TP1-Pin 1: TRACK SEARCH MODE (RF) 500mV/div 200μsec/div  — V_{REF}	⑤ IC202-Pin1: PLAY MODE (FODR) 1V/div 1msec/div  — GND	⑧ IC201-Pin 4: PLAY MODE (CADR) 1V/div 2S/div  — GND
③ TP1-Pin 6: PLAY MODE (FOER) 100mV/div 10msec/div  — V_{REF}	⑥ IC202-Pin3: PLAY MODE (TRDR) 1V/div 1msec/div  — GND	⑧ IC201-Pin 4: TRACK SEARCH MODE (CADR) 2V/div 200msec/div  — GND
④ TP1-Pin 2: PLAY MODE (TRER) 1V/div 10msec/div  — V_{REF}	⑥ IC202-Pin3: 50T-JUMP (*1) MODE (TRDR) 1V/div 1msec/div  — GND	⑨ IC151-Pin 21: PLAY MODE (EFM) 2V/div 500nsec/div  — GND
④ TP1-Pin 2: 50T-JUMP (*1) MODE (TRER) 1V/div 1msec/div  — V_{REF}	⑦ IC201-Pin 3: PLAY MODE (SPDR) 1V/div 50msec/div  — GND	⑩ IC401-Pin 9: PLAY MODE (1kHz) ($\overline{LO}$) (D/A DATA OUT) 1V/div 200μsec/div  — GND

*3 POWER ON : Plug AC cord into AC wall socket.
*4 POWER OFF: Unplug AC cord from AC wall socket.

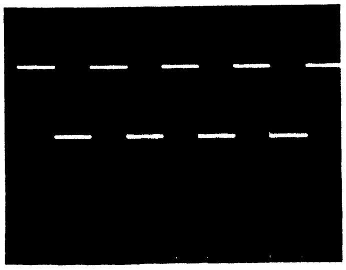
⑪ IC401-pin 10: PLAY MODE (1kHz)
(LO)
1V/div 200nsec/div



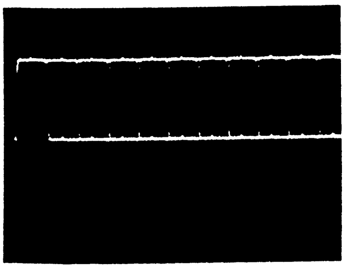
⑯ IC301-Pin 40: PLAY MODE (1kHz)
(BCLK)
2V/div 500nsec/div



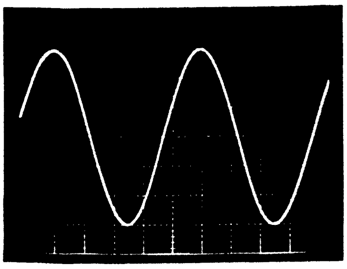
⑱ IC301-Pin 42: PLAY MODE (1kHz)
(LRCK)
2V/div 10μsec/div



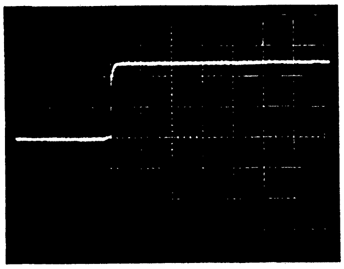
⑲ IC301-Pin 41: PLAY MODE (1kHz)
(DATA)
2V/div 500nsec/div



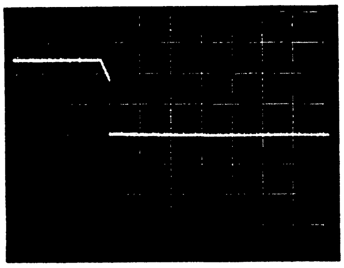
㉑ Pin -OUTPUT: PLAY MODE (1kHz)
1V/div 200μsec/div



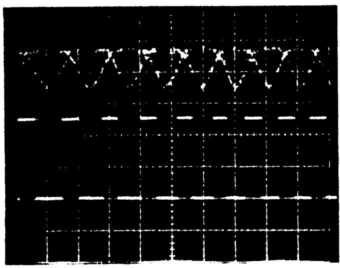
㉒ IC20-Pin 9: POWER ON (*3)
(RST)
2V/div 100msec/div



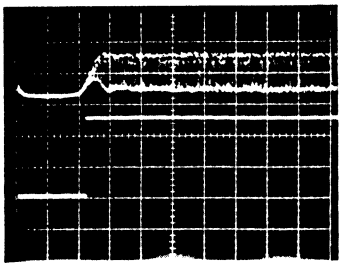
㉒ IC20-Pin 9: POWER OFF (*4)
(RST)
2V/div 100msec/div



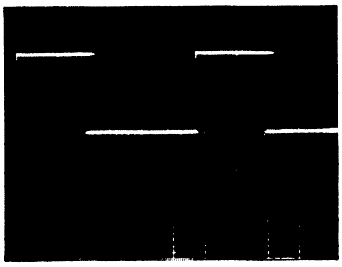
㉓ : TRACK SEARCH MODE
Upper: TP1-Pin 1 (RF) 1V/div
Lower: IC151-Pin 48 (MIRR)
2V/div 200μsec/div



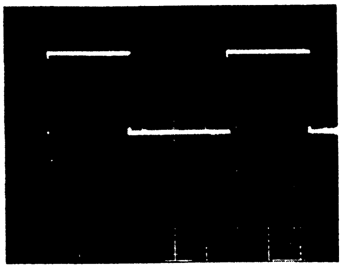
㉔ : PLAY MODE (DFCT)
Upper: TP1-Pin 1 (RF) 1V/div
Lower: IC151-Pin 1 (FOK)
2V/div 500μsec/div



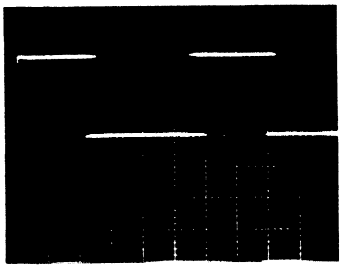
㉚ IC151-Pin 34, Pin 36: PLAY MODE
(1kHz) (FF, TF) (FOCUS, TRACKING)
2V/div 2μsec/div



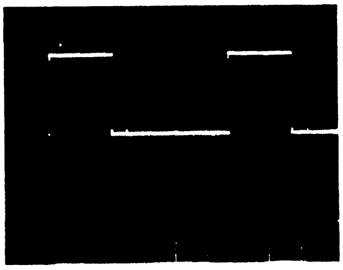
㉜ IC151-Pin 39: PLAY MODE
(SF) (CARRIAGE)
2V/div 2μsec/div



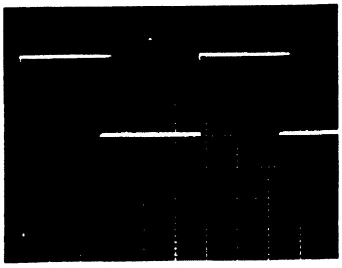
㉞ IC151-Pin 35, Pin 37: PLAY MODE
(1kHz) (FR, TR) (FOCUS, TRACKING)
2V/div 2μsec/div



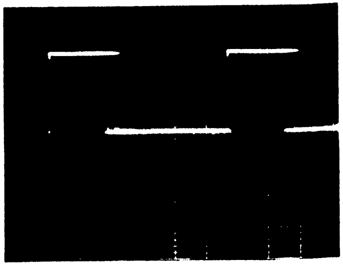
㊱ IC151-Pin 40: PLAY MODE
(SR) (CARRIAGE)
2V/div 2μsec/div



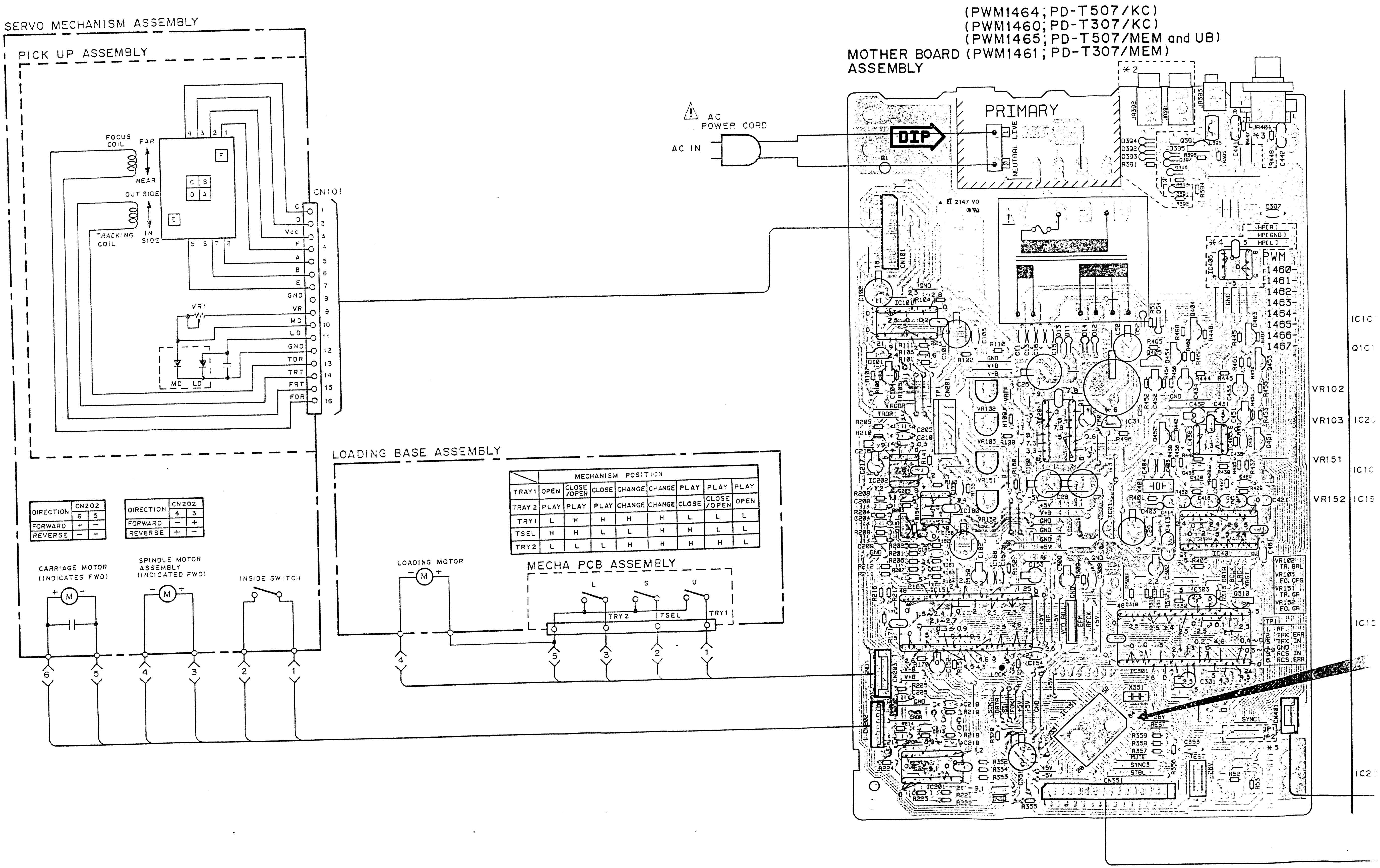
㊸ IC301-Pin 16: PLAY MODE
(MDF) (SPINDLE)
2V/div 2μsec/div



㊹ IC301-Pin 17: PLAY MODE
(MDR) (SPINDLE)
2V/div 2μsec/div



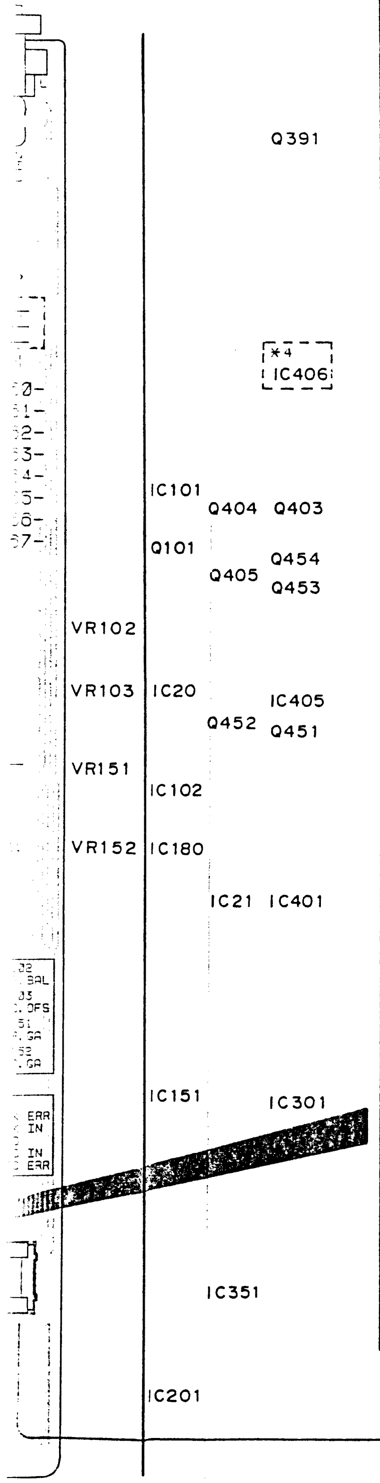
6. P.C. BOARDS CONNECTION DIAGRAM


SERVO MECHANISM ASSEMBLY
PICK UP ASSEMBLY
FOCUS COIL
FAR
NEAR
OUT SIDE
IN SIDE
TRACKING COIL
VR1
MD
LD
CN101
C
D
Vcc
F
A
B
E
GND
VR
MD
LD
GND
TDR
TRT
FRT
FDR
CARRIAGE MOTOR (INDICATES FWD)
SPINDLE MOTOR ASSEMBLY (INDICATED FWD)
INSIDE SWITCH
LOADING BASE ASSEMBLY
LOADING MOTOR
MECHA PCB ASSEMBLY
L
S
U
TRY2
TSEL
TRY1
AC POWER CORD
AC IN
(PWM1464; PD-T507/KC)
(PWM1460; PD-T307/KC)
(PWM1465; PD-T507/MEM and UB)
MOTHER BOARD (PWM1461; PD-T307/MEM)
ASSEMBLY
PRIMARY
DIP
LIVE
NEUTRAL
CN101
CN201
CN202
CN551
IC101
IC151
IC201
IC301
IC351
IC401
IC406
VR102
VR103
VR151
VR152
PWM
1460
1461
1462
1463
1464
1465
1466
1467
VR102 TR. BAL
VR103 FO. OFS
VR151 TR. GA
VR152 FO. GA
TP1
RF
TRK ERR
TRK IN
GND
FCS IN
FCS ERR
HP(R)
HP(GND)
HP(L)
TEST
SYNC1
SYNC3
STBL
MUTE
X351
*2
*3
*4
*5
*6

DIRECTION	CN202	
	6	5
FORWARD	+	−
REVERSE	−	+

DIRECTION	CN202	
	4	3
FORWARD	−	+
REVERSE	+	−

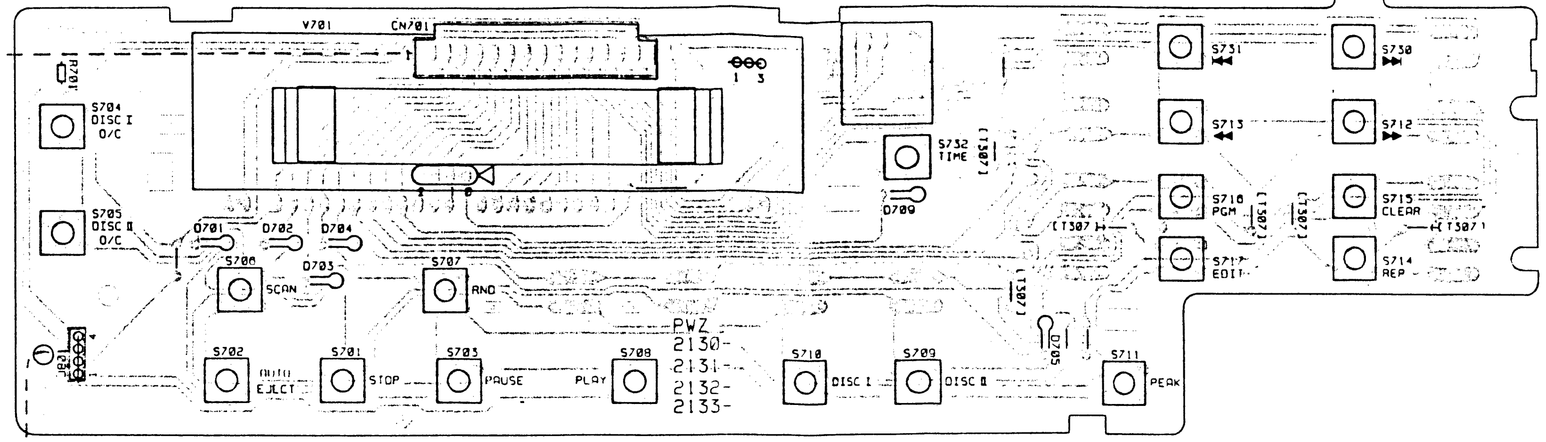
	MECHANISM POSITION							
TRAY1	OPEN	CLOSE /OPEN	CLOSE	CHANGE	CHANGE	PLAY	PLAY	PLAY
TRAY 2	PLAY	PLAY	PLAY	CHANGE	CHANGE	CLOSE	CLOSE /OPEN	OPEN
TRY1	L	H	H	H	H	L	L	L
TSEL	H	H	L	L	H	H	L	L
TRY2	L	L	L	H	H	H	H	L


Q391
*4
IC406
IC101
Q404 Q403
Q101
Q454
Q405
Q453
VR102
VR103
IC20
IC405
Q452
Q451
VR151
IC102
VR152
IC180
IC21 IC401
IC151
IC301
IC351
IC201
BAL
OFS
ERR IN
IN ERR

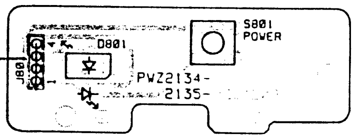
IC351 (PD4330A)

Pin No	Volts	Pin No.	Volts
1	5.0	33	0.3 ~ 0.9
2	−23.0	34	0.4 ~ 0.6
3	−23.0	35	0.0
4	−23.0	36	5.0
5	−23.0	37	5.0
6	−23.0	38	0.0
7	−23.0	39	0.0
8	−23.0	40	0.0
9	−23.0	41	4.9
10	−23.0	42	0.0
11	−26.4	43	0.0
12	5.0	44	5.0
13	5.0	45	5.0
14	0.0	46	5.0
15	0.0	47	4.6
16	−7.3	48	5.0
17	−4.2	49	5.0
18	−26.3	50	0.0
19	−5.0	51	0.0
20	−4.3	52	5.0
21	−10.5	53	5.0
22	-9.6 ~ -0.4	54	5.0
23	-1.2 ~ 1.9	55	5.0
24	-1.1 ~ 1.9	56	2.3
25	-9.8 ~ -0.5	57	2.5
26	5.0	58	0.0
27	−16.6	59	0.0
28	-25.9 ~-16.3	60	5.0
29	-19.8 ~-13.3	61	0.0
30	-16.3 ~ -6.2	62	0.0
31	0.0	63	0.0
32	4.8	64	0.0

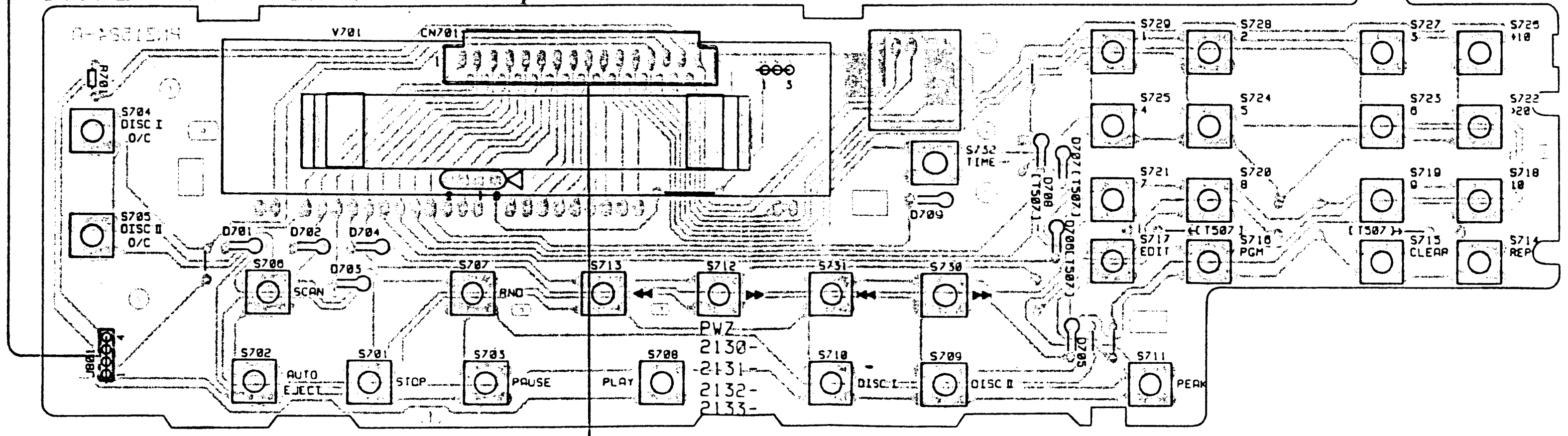
DISPLAY ASSEMBLY (PWZ2130; PD-T307 SERIES)


V701
CN701
JP701
S704 DISC I O/C
S705 DISC II O/C
D701 D702 D704
D703
S706 SCAN
S707 RND
S702 AUTO EJECT
S701 STOP
S703 PAUSE
S708 PLAY
PWZ 2130- 2131- 2132- 2133-
S710 DISC I
S709 DISC II
S711 PEAK
S731
S730
S713
S712
S732 TIME
D709
S716 PGM
S715 CLEAR
S717 EDIT
S714 REP
D705
(T307)

SW ASSEMBLY

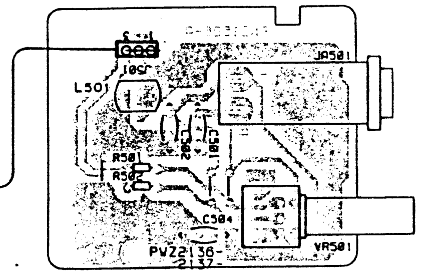

S801 POWER
D801
JP801
PWZ2134- 2135-

DISPLAY ASSEMBLY (PWZ2132 ; PD-T507 SERIES)


V701
CN701
JP701
S704 DISC I O/C
S705 DISC II O/C
D701 D702 D704
D703
S706 SCAN
S707 RND
S713
S712
S731
S730
S702 AUTO EJECT
S701 STOP
S703 PAUSE
S708 PLAY
PWZ 2130- 2131- 2132- 2133-
S710 DISC I
S709 DISC II
S711 PEAK
S732 TIME
D709
S729 1
S728 2
S727 3
S726 +10
S725 4
S724 5
S723 6
S722 >20
S721 7
S720 8
S719 9
S718 10
S717 EDIT
S716 PGM
S715 CLEAR
S714 REP
D707 (T507)
D708 (T507)
D706 (T507)
D705
JP801

*4

HEADPHONE BOARD ASSEMBLY


L501
JA501
R501
R502
C504
VR501
PWZ2136- 2137-

NOTE :

*1 ;

	D391
PD-T507/KC	USED
PD-T507/MEM,UB	OPEN
PD-T307 SERIES	OPEN

*2 ; PD-T507/KC and PD-T307 SERIES ONLY.

*3 ;

	R447	R448
PD-T507 SERIES PD-T307/MEM	USED	USED
PD-T307/KC	SHORT	SHORT

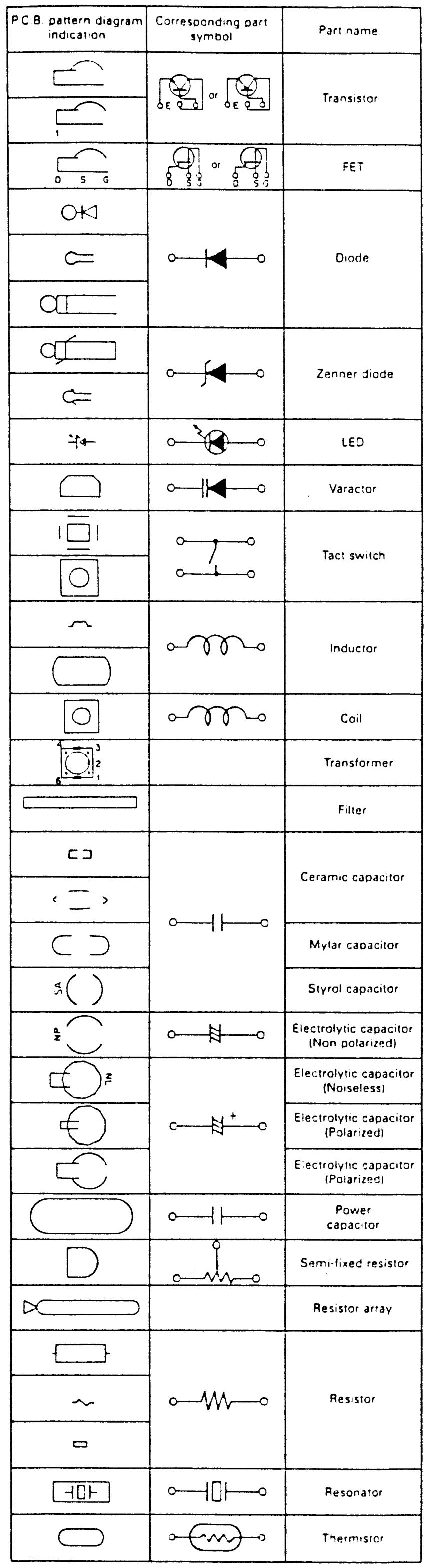
*4 ; PD-T507 SERIES and PD-T307/MEM ONLY.

*5 ;

	JP1	JP2
PD-T307 SERIES PD-T507/KC	USED	OPEN
PD-T507/MEM,UB	OPEN	USED

*6 ;

	IC31
PWM1461 PWM1465	USED ICP-N10
PWM1460 PWM1464	JUMPER


P.C.B pattern diagram indication
Corresponding part symbol
Part name
E C B
or
Transistor
D S G
FET
Diode
Zenner diode
LED
Varactor
Tact switch
Inductor
Coil
Transformer
Filter
Ceramic capacitor
Mylar capacitor
Styrol capacitor
NP
Electrolytic capacitor (Non polarized)
NL
Electrolytic capacitor (Noiseless)
Electrolytic capacitor (Polarized)
Electrolytic capacitor (Polarized)
Power capacitor
Semi-fixed resistor
Resistor array
Resistor
Resonator
Thermistor

1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with ⊃ shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.

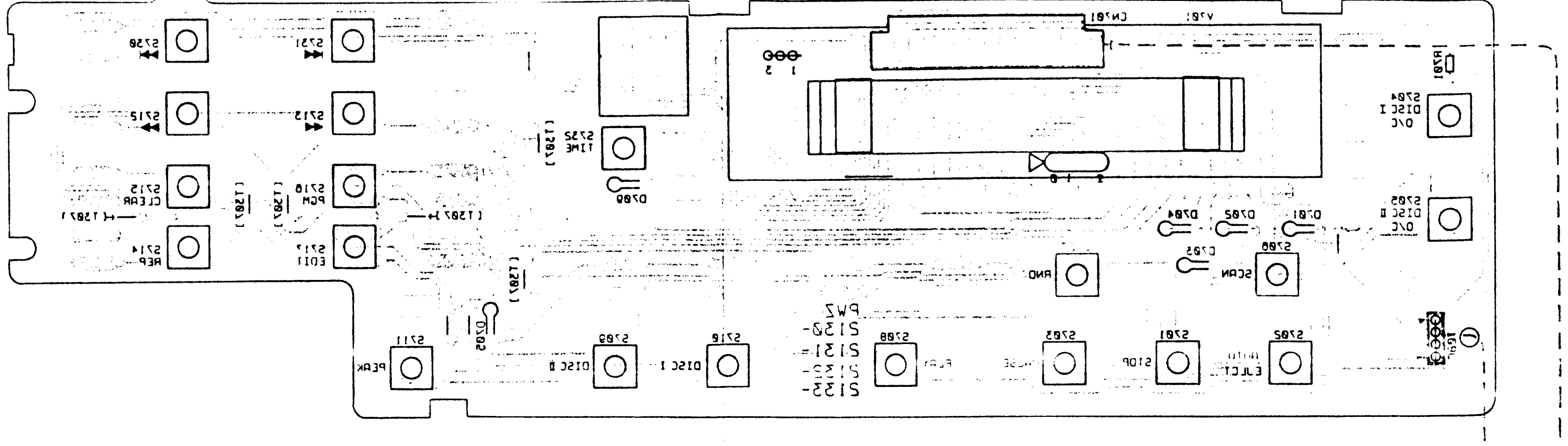
A

B

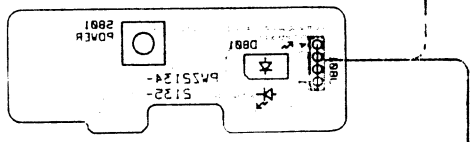
C

D

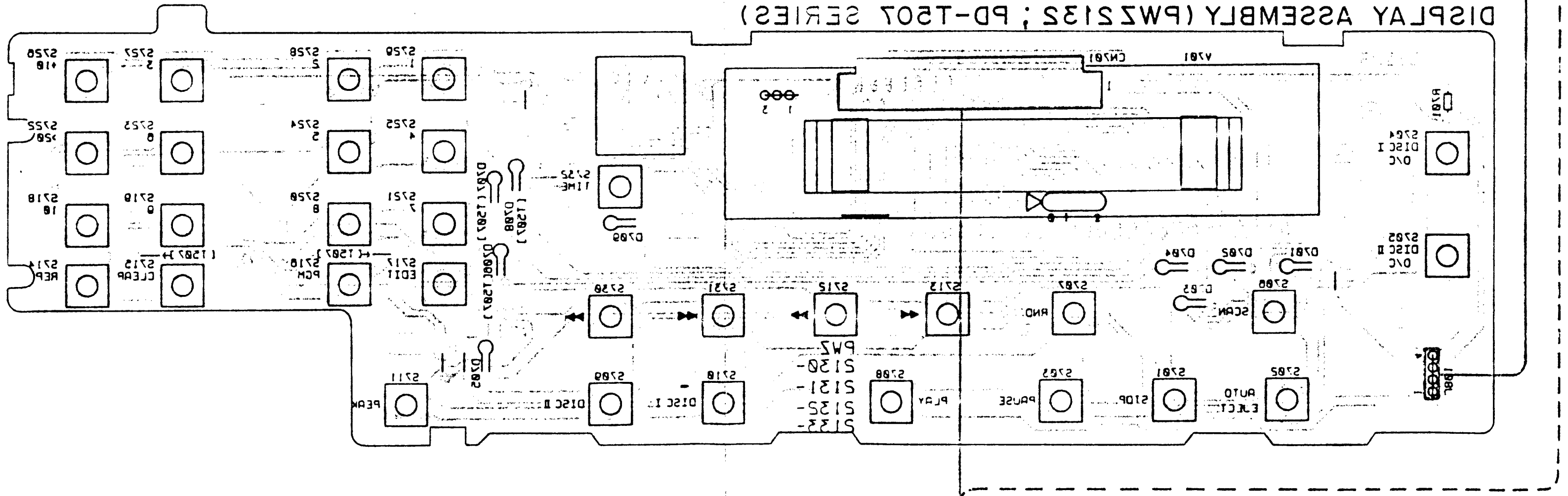
DISPLAY ASSEMBLY (PWZ2130; PD-T307 SERIES)


S730
S731
S712
S713
S715 CLEAR
S716 PCM
S714 REP
S717 EDIT
S732 TIME
D789
S704 DISC I O/C
S703 DISC II O/C
D784
D782
D781
S706 SCAN
RND
S711 PEAK
S709 DISC II
S710 DISC I
S708 PLAY
S707 PAUSE
S701 STOP
S702 OPEN/CLOSE EJECT
PWZ-2130-2131-2132-2133
CN701
V701

SW ASSEMBLY


S801 POWER
D801
PWZ2134-2135-

DISPLAY ASSEMBLY (PWZ2132; PD-T507 SERIES)


S726 +10
S727 3
S728 2
S729 1
S722 >20
S723 6
S724 5
S725 4
S718 10
S719 9
S720 8
S721 7
S714 REP
S715 CLEAR
S716 PCM
S717 EDIT
S732 TIME
D789
S704 DISC I O/C
S703 DISC II O/C
S706 SCAN
RND
S711 PEAK
S709 DISC II
S710 DISC I
S708 PLAY
S707 PAUSE
S701 STOP
S702 AUTO EJECT
PWZ-2130-2131-2132-2133
CN701
V701

NOTE :

*1 ;

	D391
PD-T507/KC	USED
PD-T507/MEM, UE	OPEN
PD-T307 SERIES	OPEN

*2 ; PD-T507/KC and PD-T307 SERIES ONLY.

*3 ;

	R447	R448
PD-T507 SERIES PD-T307/MEM	USED	USED
PD-T307/KC	SHORT	SHORT

*4 ; PD-T507 SERIES and PD-T307/MEM ONLY.

*5 ;

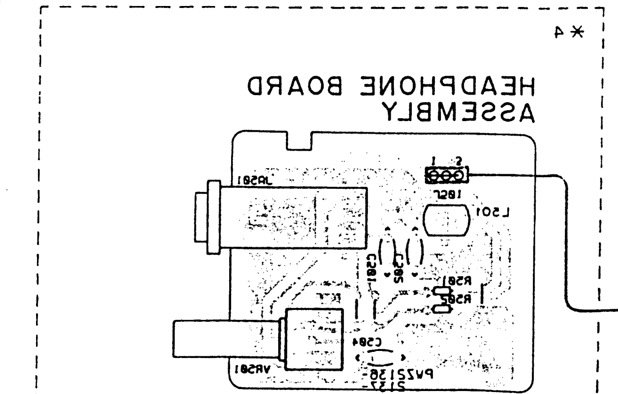
	JP1	JP2
PD-T307 SERIES PD-T507/KC	USED	OPEN
PD-T507/MEM, UE	OPEN	USED

*6 ;

	IC31
PWM1461 PWM1465	USED ICP-N10
PWM1460 PWM1464	JUMPER

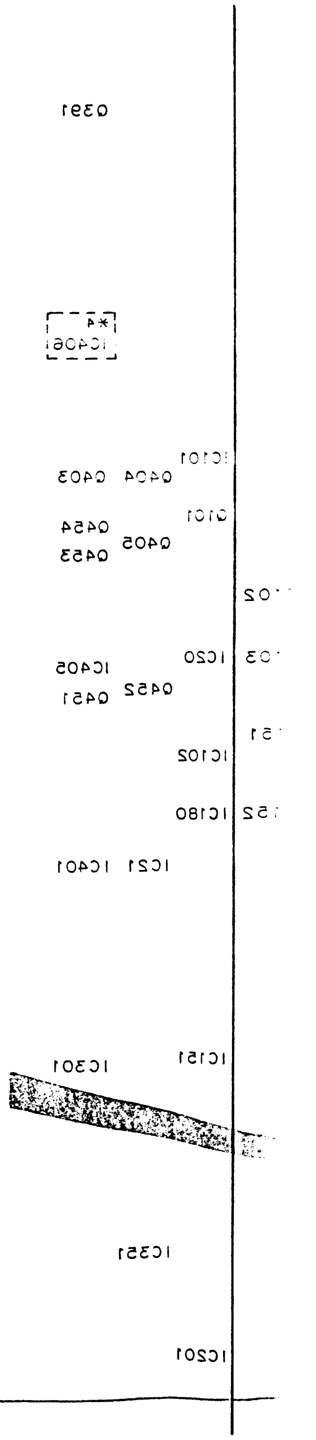
*4

HEADPHONE BOARD ASSEMBLY


JA581
CN581
L581
C582
R581
R582
C584
VR581
PWZ2136-2137

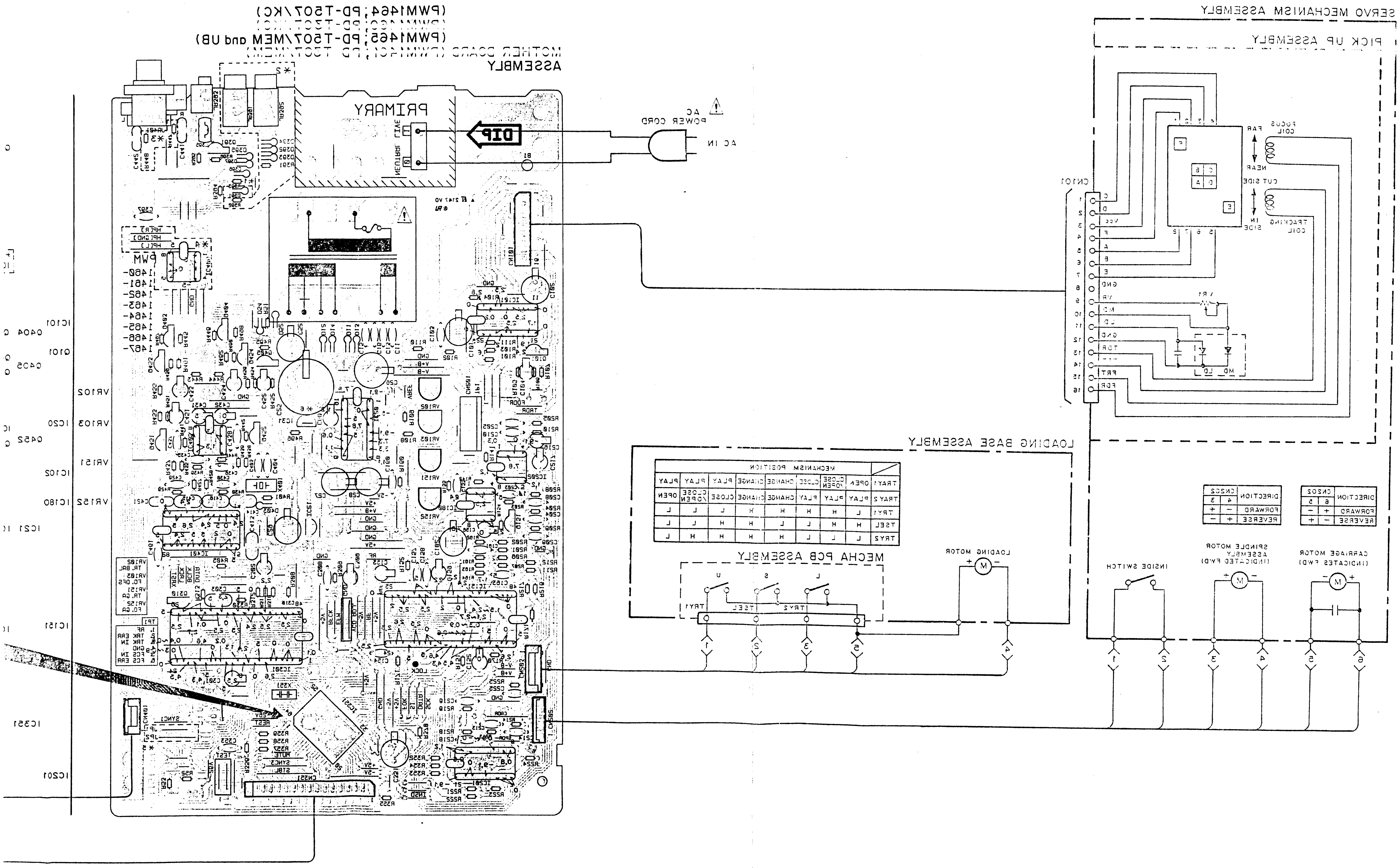
[illegible] (A830A)

No	Volts	No	Volts
1	5.0	33	03~06
2	-23.0	34	04~06
3	-23.0	35	0.0
4	-23.0	36	5.0
5	-23.0	37	5.0
6	-23.0	38	0.0
7	-23.0	39	0.0
8	-23.0	40	0.0
9	-23.0	41	4.9
10	-23.0	42	0.0
	-26.4	43	0.0
12	5.0	44	5.0
13	5.0	45	[illegible]
14	0.0	46	[illegible]
15	0.0	47	4.6
16	-7.3	48	5.0
17	-4.0	49	5.0
18	-26.5	50	0.0
19	-5.0	51	0.0
20	-4.3	52	5.0
21	-10.5	53	5.0
22	-9.6~-0.4	54	5.0
23	-1.2~1.9	55	5.0
24	-1.1~1.9	56	2.3
25	-9.8~-0.5	57	2.5
26	5.0	58	0.0
27	-16.6	59	0.0
28	-25.9~-16.3	60	5.0
29	-19.6~-15.3	61	0.0
30	-16.3~-6.2	62	0.0
31	0.0	63	0.0
32	4.8	64	0.0


Q391
*4 IC406
IC101
Q403 Q404
Q101
Q454 Q405
Q453
IC405 IC20
Q451 Q452
IC102
IC180
IC21 IC401
IC301 IC151
IC351
IC201

6. P.C. BOARDS CONNECTION DIAGRAM

This P.C.B. connection diagram is viewed from the foil side.


(PWM1464 ; PD-T507/KC)
(PWM1465 ; PD-T507/MEM and UB)
MOTHER BOARD ASSEMBLY
PRIMARY
DIP
AC POWER CORD
AC IN
SERVO MECHANISM ASSEMBLY
PICK UP ASSEMBLY
FOCUS COIL
FAR
NEAR
OUT SIDE
IN SIDE
TRACKING COIL
CN101
LOADING BASE ASSEMBLY
MECHANISM POSITION
TRAY1
TRAY2
TRY1
TSEL
TRY2
OPEN
PLAY
CLOSE
CHANGE
MECHA PCB ASSEMBLY
LOADING MOTOR
INSIDE SWITCH
SPINDLE MOTOR ASSEMBLY (INDICATED FWD)
CARRIAGE MOTOR (INDICATED FWD)
DIRECTION
FORWARD
REVERSE
6
5
4
3
2
1
A
B
C
D

7. P.C.B's PARTS LIST

NOTES:

- Parts without part number cannot be supplied.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%)

560 Ω → 56 × 10^1 → 561 ································ RD1/4PS$\boxed{5}\boxed{6}\boxed{1}$J
47k Ω → 47 × 10^3 → 473 ································ RD1/4PS$\boxed{4}\boxed{7}\boxed{3}$J
0.5 Ω → 0R5 ·· RN2H$\boxed{0}\boxed{R}\boxed{5}$K
1 Ω → 010 ·· RS1P$\boxed{0}\boxed{1}\boxed{0}$K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k Ω → 562 × 10^1 → 5621 ································ RN1/4SR$\boxed{5}\boxed{6}\boxed{2}\boxed{1}$F

⊙ MOTHER BOARD ASSEMBLY
(PWM1464: For PD–T507)
(PWM1460: For PD–T307)

SEMICONDUCTORS

Mark	No.	Description	Part No.
⚠	IC20	REGULATOR IC	M5298P
	IC21	REGULATOR. IC	NJM2930-L05
	IC101	PRE AMP IC	CXA1471S
	IC151	SERVO. IC	UPD6374CU
	IC180	OP-AMP IC	NJM4558D-D
⚠	IC201	POWER OP-AMP. IC	LA6520
⚠	IC202	POWER OP-AMP. IC	LA6517
	IC301	DATA PROCESSER. IC	UPD6375CU
	IC351	MICROCOMPUTER. IC	PD4330A
	IC401	D/A CONVERTER. IC	PD2026A
	IC405	OP-AMP IC	NJM4558D-D
	IC406	OP-AMP IC	BA15218 (PWM1464 only)
	Q101	TRANSISTOR	2SA854S
	Q151	TRANSISTOR	2SA933S
	Q310	TRANSISTOR	2SC3732
	Q451, 452	TRANSISTOR	DTA124ES
	Q453, 454	TRANSISTOR	2SB1296
	Q391	TRANSISTOR	2SC1740S
	Q403, 404	TRANSISTOR	2SD2144S
	Q405	TRANSISTOR	DTC124ES
⚠	D11-14	DIODE	11ES2
⚠	D52	DIODE	11ES2
	D54	ZENNER DIODE	MTZJ18B
	D391	DIODE	1SS254 (PWM1464 only)
	D392-397, 403	DIODE	1SS254

COILS/TRANSFORMERS

Mark	No.	Description	Part No.
	L395	RADIAL INDUCTOR	LFAR22M

CAPACITORS

Mark	No.	Description	Part No.
	C11	CERAMIC CAPACITOR	CKCYF103Z50
	C13	CERAMIC CAPACITOR	CKCYF103Z50
	C15, 16	CERAMIC CAPACITOR	CKCYF103Z50
	C25	ELECTR. CAPACITOR	CEAS332M16
	C26	ELECTR. CAPACITOR	CEAS102M16
	C27	ELECTR. CAPACITOR	CEAS471M6R3
	C28	ELECTR. CAPACITOR	CEAS101M10
	C29	ELECTR. CAPACITOR	CEAS471M6R3
	C52	ELECTR. CAPACITOR	CEAS101M35
	C60	ELECTR. CAPACITOR	CEAS010M50
	C101	ELECTR. CAPACITOR	CEAS471M6R3
	C102	ELECTR. CAPACITOR	CEAS101M10
	C103	CERAMIC CAPACITOR	CCCCH200J50
	C104	ELECTR. CAPACITOR	CEAS101M10
	C152, 153	ELECTR. CAPACITOR	CEAS330M16
	C154	CERAMIC CAPACITOR	CKCYB471K50
	C155	CERAMIC CAPACITOR	CKCYB821K50
	C156	ELECTR. CAPACITOR	CEAS010M50
	C157	CERAMIC CAPACITOR	CKCYB222K50
	C158	CERAMIC CAPACITOR	CKCYB472K50
	C159	ELECTR. CAPACITOR	CEAS330M16
	C160, 161	CERAMIC CAPACITOR	CKCYB821K50
	C163	CERAMIC CAPACITOR	CKCYB821K50
	C182	ELECTR. CAPACITOR	CEAS471M6R3
	C203, 204	CERAMIC CAPACITOR	CCCSL470J50
	C205	CERAMIC CAPACITOR	CGCYX104K25
	C208, 209	CERAMIC CAPACITOR	CCCSL470J50
	C210	CERAMIC CAPACITOR	CGCYX104K25
	C213, 214	CERAMIC CAPACITOR	CKCYB822K50
	C216, 217	ELECTR. CAPACITOR	CEAS330M16
	C218, 219	CERAMIC CAPACITOR	CKCYB222K50
	C225	CERAMIC CAPACITOR	CGCYX104K25
	C301, 302	ELECTR. CAPACITOR	CEAS330M16
	C303	MYLOR FILM CAPACITOR	CQMA104K50
	C308	CERAMIC CAPACITOR	CGCYX103K25
	C309	ELECTR. CAPACITOR	CEASR47M50
	C351	ELECTR. CAPACITOR	CEAS471M6R3
	C353	CERAMIC CAPACITOR	CKCYF103Z50
	C397	MYLOR FILM CAPACITOR	CQMA104K50
	C403	CERAMIC CAPACITOR	CCCCH120J50
	C404	CERAMIC CAPACITOR	CCCCH220J50

Mark	No.	Description	Part No.
	C413-416	MYLOR FILM CAPACITOR	CQMA104K50
	C421	MYLOR FILM CAPACITOR	CQMA103K50
	C429, 430	CERAMIC CAPACITOR	CCCCH390J50
	C431, 432	ELECTR. CAPACITOR	CEAS330M16
	C433, 434	ELECTR. CAPACITOR	CEAS220M25
	C435-438	CERAMIC CAPACITOR	CCCCH390J50
	C441, 442	MYLOR FILM CAPACITOR	CQMA152J50
	C451, 452	ELECTR. CAPACITOR	CEAS4R7M50
	C461	CERAMIC CAPACITOR	CKCYF103Z50

RESISTORS

	R51-53	CARBONFILM RESISTOR	RD1/6PM□□□J
	R101-111	CARBONFILM RESISTOR	RD1/6PM□□□J
	R141, 142	CARBONFILM RESISTOR	RD1/6PM□□□J
	R151, 152	CARBONFILM RESISTOR	RD1/6PM□□□J
	R154, 155	CARBONFILM RESISTOR	RD1/6PM□□□J
	R160-164	CARBONFILM RESISTOR	RD1/6PM□□□J
	R170, 171, 177	CARBONFILM RESISTOR	RD1/6PM□□□J
	R201-214	CARBONFILM RESISTOR	RD1/6PM□□□J
	R216-219	CARBONFILM RESISTOR	RD1/6PM□□□J
	R221-225	CARBONFILM RESISTOR	RD1/6PM□□□J
	R308-313	CARBONFILM RESISTOR	RD1/6PM□□□J
	R330	CARBONFILM RESISTOR	RD1/6PM□□□J
	R352-359	CARBONFILM RESISTOR	RD1/6PM□□□J
	R370	CARBONFILM RESISTOR	RD1/6PM□□□J
	R391-396	CARBONFILM RESISTOR	RD1/6PM□□□J
	R401	CARBONFILM RESISTOR	RD1/6PM□□□J
	R405	CARBONFILM RESISTOR	RD1/6PM□□□J
	R427-430	CARBONFILM RESISTOR	RD1/6PM□□□J
	R435-444	CARBONFILM RESISTOR	RD1/6PM□□□J
	R445, R446	CARBONFILM RESISTOR	RD1/6PM271J (For PWM1464)
	R445, R446	CARBONFILM RESISTOR	RD1/6PM681J (For PWM1460)
	R447, R448	CARBONFILM RESISTOR	RD1/6PM471J (PWM1464 only)
	R451-456	CARBONFILM RESISTOR	RD1/6PM□□□J
	R459-462	CARBONFILM RESISTOR	RD1/6PM271J
	R495-498	CARBONFILM RESISTOR	RD1/6PM□□□J
	VR102	VR(22kΩ)	VRTB6VS223
	VR103	VR(1kΩ)	VRTB6VS102
	VR151, 152	VR(22kΩ)	VRTB6VS223

OTHERS

	CN101	CONNECTOR	52045-1610
	CN351	CONNECTOR	HLEM31S-1 (For PWM1464)
	CN351	CONNECTOR	HLEM29S-1 (For PWM1460)
	JA391, 392	JACK/12V	PKN1004
	JA393	JACK	PKN1005
	JA401	JACK	PKB1009
	X351	CERAMIC RESONATOR	VSS1014
	X401	XTAL RES (OSC)	PSS1006

Mark	No.	Description	Part No.

MECHANISM BOARD ASSEMBLY (For PD–T507 and PD–T307)

SWITCHES

	S601-603	PUSH SWITCH	DSG1017

⊙ DISPLAY ASSEMBLY (PWZ2132: For PD–T507) (PWZ2130: For PD–T307)

SEMICONDUCTORS

	D701-705	DIODE	1SS254
	D706-708	DIODE	1SS254 (PWZ2132 only)
	D709	DIODE	1SS154

SWITCHES

	S701-717	SWITCH	PSG1006
	S718-729	SWITCH	PSG1006 (PWZ2132 only)
	S730-732	SWITCH	PSG1006

RESISTORS

	R701	CARBONFILM RESISTOR	RD1/6PM□□□J

OTHERS

	CN701	CONNECTOR	HLEM31R-1 (For PWZ2132)
	CN701	CONNECTOR	HLEM29R-1 (For PWZ2130)
	V701	FL INDICATOR TUBE	PEL1052
		REMOTE SENSOR	GP1U50X (PWZ2132 only)

SW ASSEMBLY (For PD–T507 and PD–T307)

SEMICONDUCTORS

	D801	LED	PCX1019

SWITCHES

	S801	SWITCH	PSG1006

HEADPHONE ASSEMBLY (PD–T507 only)

COILS/TRANSFORMER

	L501	RADIAL INDUCTOR	LFAR22M

CAPACITORS

	C501, 502	CERAMIC CAPACITOR	CKCYF103Z50
	C504	CERAMIC CAPACITOR	CKCYF473Z50

RESISTORS

	R501, 502	CARBONFILM RESISTOR	RD1/6PM□□□J
	VR501		PCS1003

OTHERS

	JA501	JACK	RKN1002

8. ADJUSTMENTS

1. Adjustment Methods

If a disc player is adjusted incorrectly or inadequately, it may malfunction or not work at all even though there is nothing at all wrong with the pickup or the circuitry. Adjust correctly following the adjustment procedure.

1-1 Adjustment items/verification items and order

Step	Item	Test point	Adjustment location
1	Focus offset adjustment	TP1, Pin 6 (FCS. ERR)	VR103 (FCS. OFS)
2	Grating adjustment	TP1, Pin 2 (TRK. ERR)	Grating adjustment slit
3	Tracking error balance adjustment	TP1, Pin 2 (TRK. ERR)	VR102 (TRK. BAL)
4	Pickup radial/ tangential direction tilt adjustment	TP1, Pin 1 (RF)	Radial tilt adjustment screw, Tangential tilt adjustment screw
5	RF level adjustment	TP1, Pin 1 (RF)	VR1 (RF level)
6	Focus servo loop gain adjustment	TP1, Pin 5 (FCS. IN) TP1, Pin 6 (FCS. ERR)	VR152 (FCS. GAN)
7	Tracking servo loop gain adjustment	TP1, Pin 3 (TRK. IN) TP1, Pin 2 (TRK. ERR)	VR151 (TRK. GAN)
8	Focus error signal verification	TP1, Pin 6 (FCS. ERR)	———

● **Abbreviation table**

FCS. ERR : Focus Error
FCS. OFS : Focus Offset
TRK. ERR : Tracking Error
TRK. BAL : Tracking Balance
FCS. IN : Focus In
TRK. IN : Tracking In

1-2 Measuring instruments and tools

1. Dual trace oscilloscope (10:1 probe)
2. Low-frequency oscillator
3. Test disc (YEDS-7)
4. 12-cm disc (with at least about 70 minutes of recording)
5. Low-pass filter (39 kΩ + 0.001 μF)
6. Resistor (100 kΩ)
7. Hexagonal wrench (M3 mm)
8. Standard tools

1-3 Test point and adjustment variable resistor positions

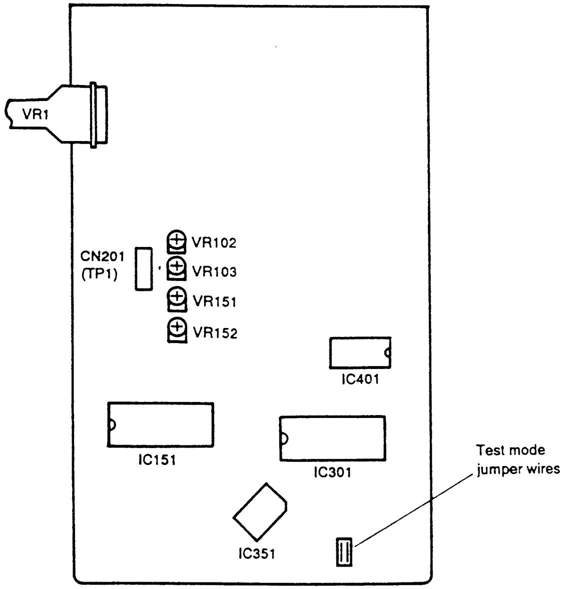


Figure 1 Adjustment Locations

1-4 Notes

1. Use a 10:1 probe for the oscilloscope.
2. All the knob positions (settings) for the oscilloscope in the adjustment procedures are for when a 10:1 probe is used.
3. Measure the waveform and voltage between any measuring point and VREF (TP1, Pin 4), because VREF is designed to be electric base of the circuit.

1-5 Test mode

These models have a test mode so that the adjustments and checks required for service can be carried out easily. When these models are in test mode, the keys on the front panel work differently from normal. Adjustments and checks can be carried out by operating these keys with the correct procedure. For these models, all adjustments are carried out in test mode.

[Setting these models to test mode]

How to set this model into test mode.
1. Unplug the power cord from the AC socket.
2. Short the test mode jumper wires. (See Figure 1.)
3. Plug the power cord back into the AC socket.

When the test mode is set correctly, the display is different from what it usually is when the power is turned on. If the display is still the same as usual, test mode has not been set correctly, so repeat Steps 1-3.

[Release from test mode]

Here is the procedure for releasing the test mode:
1. Press the STOP key to stop all operations.
2. Unplug the power cord from the AC socket.

[Operations of the keys in test mode]

Code	Key name	Function in test mode	Explanation
	PGM (PROGRAM)	Focus servo close	If Disc Tray 1 is closed, Disk Tray 1 is moved to the play position. Then the laser diode is lit up and the focus actuator is lowered, then raised slowly and the focus servo is closed at the point where the objective lens is focused on the disc. With the player in this state, if you lightly rotate the stopped disc by hand, you can hear the sound of the focus servo. If you can hear this sound, the focus servo is operating correctly. If you press this key with no disc mounted, the laser diode lights up, the focus actuator is pulled down, then the actuator is raised and lowered for 3 second and returned to its original position.
►	PLAY	Spindle servo ON	Starts the spindle motor in the clockwise direction and when the disc rotation reaches the prescribed speed (about 500 rpm at the inner periphery), sets the spindle servo in a closed loop. Be careful. Pressing this key when there is no disc mounted makes the spindle motor run at the maximum speed. If the focus servo does not go correctly into a closed loop or the laser light shines on the mirror section at the outermost periphery of the disc, the same symptom is occurred.
❚❚	PAUSE	Tracking servo close/open	Pressing this key when the focus servo and spindle servo are operating correctly in closed loops puts the tracking servo into a closed loop, displays the track number being played back and the elapsed time on the front panel, and outputs the playback signal. If the elapsed time is not displayed or not counted correctly or the audio is not played back correctly, it may be that the laser is shining on the section with no sound recorded at the outer edge of the disc, that something is out of adjustment, or that there is some other problem. This key is a toggle key and open/close the tracking servo alternately. This key has no effect if no disc is mounted.
◄◄	MANUAL SEARCH REV	Carriage reverse (inwards)	Moves the pickup position toward the inner periphery of the disc. When this key is pressed with the tracking servo in a closed loop, the tracking servo automatically goes into an open loop. Since the pickup does not automatically stop at the mechanical end point in test mode, be careful with this operation.
►►	MANUAL SEARCH FWD	Carriage forward (outwards)	Moves the pickup position toward the outer periphery of the disc. When this key is pressed with the tracking servo in a closed loop, the tracking servo automatically goes into an open loop. Since the pickup does not automatically stop at the mechanical end point in test mode, be careful with this operation.
■	STOP	Stop	Switches off all the servos and initializes. The pickup remains where it was when this key was pressed.
▲	OPEN/CLOSE DISC 1	Disc tray open/close	Opens/closes the disc tray. This key is a toggle key and open/close tray alternately.

[How to play back a disc in test mode]

In test mode, since the servos operate independently, playing back a disc requires that you operate the keys in the correct order to close the servos.
Here is the key operation sequence for playing back a disc in test mode.

PGM (PROGRAM)	Lights up the laser diode and closes the focus servo.
⇓	
PLAY ▶	Starts the spindle motor and closes the spindle servo.
⇓	
PAUSE ❚❚	Closes the tracking servo.

Wait at least 2-3 seconds between each of these operations.

1. Focus offset adjustment

● Objective	Sets the DC offset for the focus error amp.		
● Symptom when out of adjustment	The player does not focus in and the RF signal is dirty.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 6 (FCS ERR). [Settings] 5 mV/division 10 ms/division DC mode	● Player state	Test mode, stopped (just the Power switch on)
		● Adjustment location	VR103 (FCS OFS)
		● Disc	None needed

[Procedure]

Adjust VR103 (FCS OFS) so that the DC voltage between TP1, Pin 6 (FCS ERR) and TP1, Pin 4 (V_{REF}) becomes -50 ± 50 mV.

2. Grating adjustment

● Objective	To align the tracking error generation laser beam spots to the optimum angle on the track		
● Symptom when out of adjustment	Play does not start, track search is impossible, tracks are skipped.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 2 (TRK ERR) via a low pass filter. (See Figure 2) [Settings] 50 mV/division 5 ms/division DC mode	● Player state	Test mode, focus and spindle servos closed and tracking servo open
		● Adjustment location	Pickup grating adjustment slit
		● Disc	12 cm disc. (YEDS-7 can not be used.)

[Procedure]

1. Move the pickup to the outer edge of the disc with the MANUAL SEARCH FWD ▶▶ or ◀◀ key so that the grating adjustment slit is at the outer edge of the disc where it can be adjusted.
2. Press the PGM key, then the PLAY ▶ key in that order to close the focus servo then the spindle servo.
3. Insert an ordinary screwdriver into the grating adjustment slit and adjust the grating to find the null point. For more details, see the next page.
4. If you slowly turn the screwdriver counterclockwise from the null point, the amplitude of the wave gradually increases, then if you continue turning the screwdriver, the amplitude of the wave becomes smaller again. Turn the screwdriver counterclockwise from the null point and set the grating to the first point where the wave amplitude reaches its maximum.

   Reference: Figure 3 shows the relation between the angle of the tracking beam with the track and the wave form.

   Note: The amplitude of the tracking error signal is about 3 Vp-p (when a 39 kΩ + 0.001 μF low pass filter is used). If this amplitude is extremely small (2 Vp-p or less), the objective lens or the pickup malfunction may be the cause. If the difference between the amplitude of the error signal at the innermost edge and outermost edge of the disc is more than 10%, the grating is not adjusted to the optimum point, so adjust it again.
5. Return the pickup to more or less midway across the disc with the MANUAL SEARCH REV ◀◀ key, press the PAUSE ▮▮ key and check that the track number and elapsed time are displayed on the front panel. If they are not displayed at this time or the elapsed time changes irregularly, check the null point and adjust the grating again.

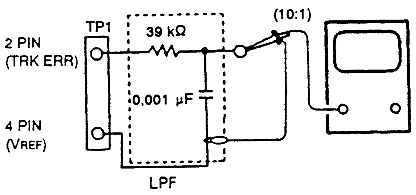
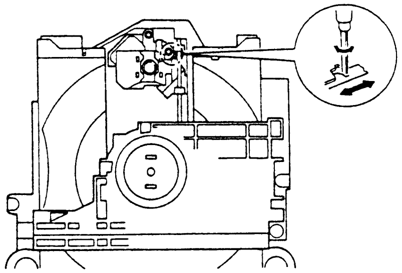


Figure 2



Adjustment Locations

[How to find the null point]

When you insert the regular screwdriver into the slit for the grating adjustment and change the grating angle, the amplitude of the tracking error signal at TP1 Pin 2 changes. Within the range for the grating, there are five or six locations where the amplitude of the wave reaches a minimum. Of these five or six locations, there is only one at which the envelope of the wave form is smooth. This location is where the three laser beams divided by the grating are all right above the same track. (See Figure 3.)
This point is called the null point. When adjusting the grating, this null point is found and used as the reference position.

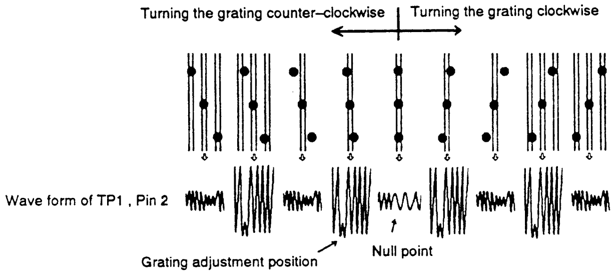
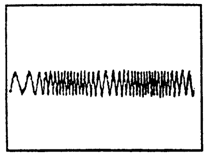
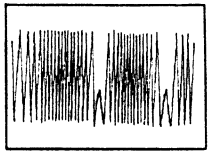

Turning the grating counter–clockwise
Turning the grating clockwise
Wave form of TP1 , Pin 2
Null point
Grating adjustment position

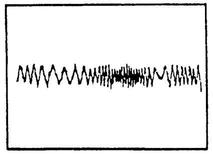
Figure 3



Nullo point waveform



Maximum amplitude waveform



Waveform other than the null point

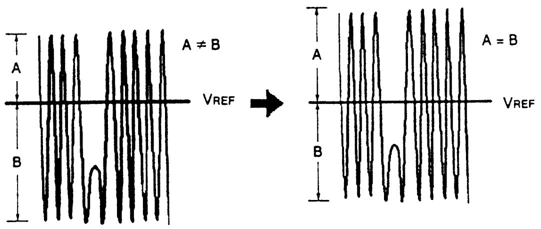
3. Tracking error balance adjustment

● Objective ● Symptom when out of adjustment	To correct for the variation in the sensitivity of the tracking photodiode Play does not start or track search is impossible

● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 2 (TRK ERR). This connection may be via a low pass filter. [Settings] 50 mV/division 5 ms/division DC mode	● Player state	Test mode, focus and spindle servos closed and tracking servo open
		● Adjustment location	VR102 (TRK BAL)
		● Disc	YEDS-7

[Procedure]

1. Move the pickup to midway across the disc (R = 35 mm) with the MANUAL SEARCH FWD ▶▶ or ◀◀ key.
2. Press the PGM (PROGRAM) key, then the PLAY ▶ key in that order to close the focus servo then the spindle servo.
3. Line up the bright line (ground) at the center of the oscilloscope screen and put the oscilloscope into DC mode.
4. Adjust VR102 (TRK BAL) so that positive amplitude and negative amplitude of the tracking error signal at TP1 Pin 2 (TRK ERR) are the same (in other words, so that there is no DC component).



When there is a DC component

When there is no DC component

---

4. Pickup radial/tangential tilt adjustment

● Objective ● Symptom when out of adjustment	To adjust the angle of the pickup relative to the disc so that the laser beams are shone straight down into the disc for the best read out of the RF signals. Sound broken; some discs can be played but not others.

● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 1 (RF). [Settings] 20 mV/division 200 ns/division AC mode	● Player state	Test mode, play
		● Adjustment location	Pickup radial tilt adjustment screw and tangential tilt adjustment screw
		● Disc	12 cm disc. (YEDS-7 can not be used.)

[Procedure]

1. Move the pickup to the outer edge of the disc with the MANUAL SEARCH FWD ▶▶ or ◀◀ key so that the radial/tangential tilt screws can be adjusted.
   Press the PGM (PROGRAM) key, the PLAY ▶ key, then the PAUSE ▮▮ key in that order to close the focus servo then the spindle servo and put the player into play mode.
2. First, adjust the radial tilt adjustment screw with an M3 mm hexagonal wrench so that the eye pattern (the diamond shape at the center of the RF signal) can be seen the most clearly.
3. Next, adjust the tangential tilt adjustment screw with an M3 mm hexagonal wrench so that the eye pattern (the diamond shape at the center of the RF signal) can be seen the most clearly (Figure 5).
4. Adjust the radial tilt adjustment screw and the tangential tilt adjustment screw again so that the eye pattern can be seen the most clearly. As necessary, adjust the two screws alternately so that the eye pattern can be seen the most clearly.

Note: Radial and tangential mean the directions relative to the disc shown in Figure 4.

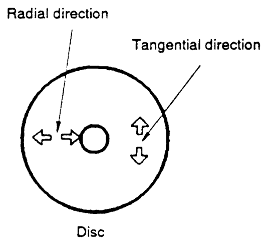
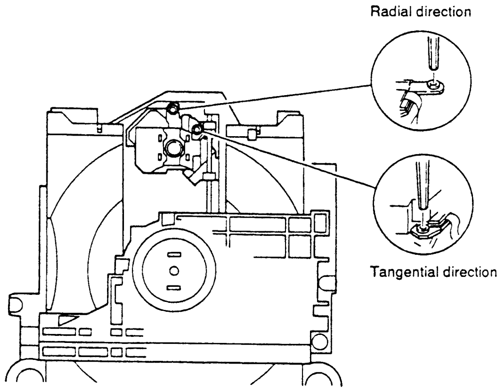


Figure 4



Adjustment Locations

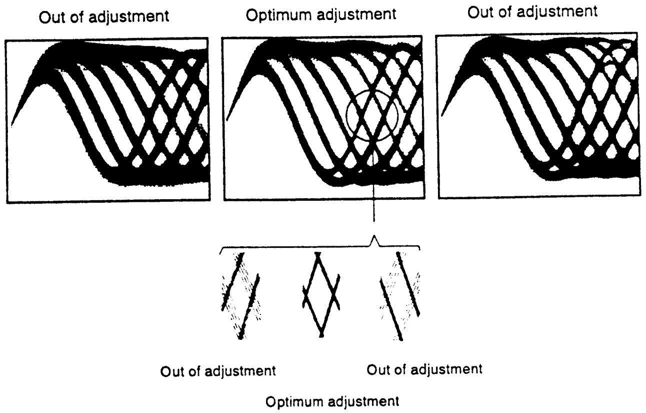

Out of adjustment
Optimum adjustment
Out of adjustment
Out of adjustment
Out of adjustment
Optimum adjustment

Figure 5 Eye Pattern

5. RF level adjustment

● Objective	To optimize the playback RF signal amplitude		
● Symptom when out of adjustment	No play or no search		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 1 (RF). [Settings] 50 mV/division 10 ms/division AC mode	● Player state ● Adjustment location ● Disc	Test mode, play VR1 (laser power) YEDS-7

[Procedure]

1. Move the pickup to midway across the disc (R = 35 mm) with the MANUAL SEARCH FWD ▶▶ or ◀◀ key, then press the PGM (PROGRAM) key, then the PLAY ▶ key in that order to close the respective servos and put the player into play mode.
2. Adjust VR1 (laser power) so that the RF signal amplitude is 1.2 Vp-p ± 0.1V.

6. Focus servo loop gain adjustment

● Objective	To optimize the focus servo loop gain		
● Symptom when out of adjustment	Playback does not start or focus actuator noisy		
● Measurement instrument connections	See Figure 6. [Settings] CH1 20 mV/division X-Y mode CH2 5 mV/division	● Player state ● Adjustment location ● Disc	Test mode, play VR152 (FCS GAN) YEDS-7

[Procedure]

1. Set the AF generator output to 1.2 kHz and 1 Vp-p.
2. Press the MANUAL SEARCH FWD ▶▶ or ◀◀ key to move the pickup to halfway across the disc (R = 35 mm), then press the PGM (PROGRAM) key, the PLAY ▶ key, then the PAUSE ▮▮ key in that order to close the corresponding servos and put the player into play mode.
3. Adjust VR152 (FCS GAN) so that the Lissajous wave form is symmetrical about the X axis and the Y axis.

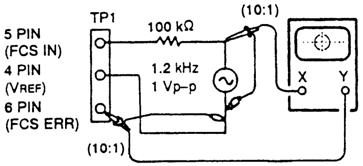
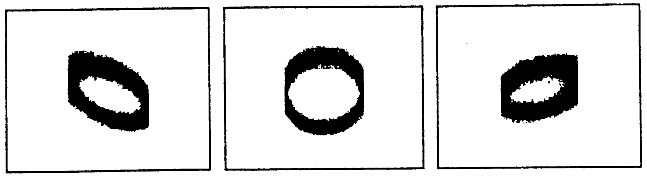


Figure 6

Focus Gain Adjustment



Higher gain

Optimum gain

Lower gain

7. Tracking servo loop gain adjustment

● Objective	To optimize the tracking servo loop gain		
● Symptom when out of adjustment	Playback does not start, during searches the actuator is noisy, or tracks are skipped.		
● Measurement instrument connections	See Figure 7. [Settings] CH1 50 mV/division X-Y mode CH2 50 mV/division	● Player state ● Adjustment location ● Disc	Test mode, play VR151 (TRK GAN) YEDS-7

[Procedure]

1. Set the AF generator output to 1.2 kHz and 2 Vp-p.
2. Press the MANUAL SEARCH FWD ▶▶ or ◀◀ key to move the pickup to halfway across the disc (R = 35 mm), then press the PGM (PROGRAM) key, the PLAY ▶ key, then the PAUSE ▮▮ key in that order to close the corresponding servos and put the player into play mode.
3. Adjust VR151 (TRK GAN) so that the Lissajous wave form is symmetrical about the X axis and the Y axis.

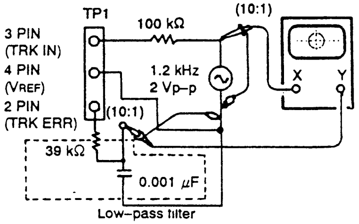
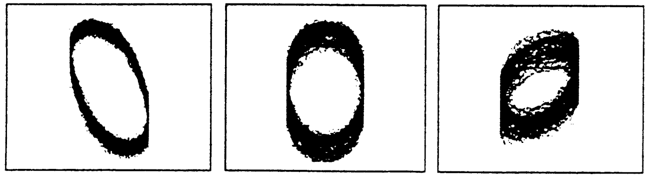


Figure 7

Tracking Gain Adjustment



Higher gain

Optimum gain

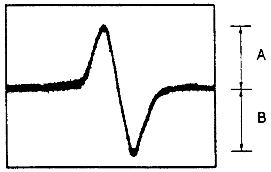
Lower gain

8. Focus error signal (focus S curve) verification

● Objective ● Symptom when out of adjustment	To judge whether the pickup is ok or not by observing the focus error signal. The pickup is judged from the amplitude of the tracking error signal (as discussed in the section on adjusting the tracking error balance) and the wave form for the focus error signal.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 6 (FCS ERR). [Settings] 100 mV/division 5 ms/division DC mode	● Player state ● Adjustment location ● Disc	Test mode, stop None YEDS-7

[Procedure]

1. Connect TP1 Pin 5 to TP1 Pin 4 (V_{REF}).
2. Mount the disc.
3. While watching the oscilloscope screen, press the PGM (PROGRAM) key and observe the wave form in Figure 8 for a moment. Verify that the amplitude is at least 2.5 Vp-p and that the positive and negative amplitude are about equal. Since the wave form is only output for a moment when the PGM (PROGRAM) key is pressed, press this key over and over until you have checked the wave form.



A = B
A + B ≧ 2.5 Vp-p

Figure 8

[Judging the pickup]

Do not judge the pickup until all the adjustments have been made correctly. In the following cases, there may be something wrong with the pickup.

1. The tracking error signal amplitude is extremely small (less than 2 Vp-p).
2. The focus error signal amplitude is extremely small (less than 2.5 Vp-p).
3. The positive and negative amplitudes of the focus error signal are extremely asymmetrical (2:1 ratio or more).
4. The RF signal is too small (less than 0.8 Vp-p) and even if VR1 is adjusted (laser power), the RF signal can not be brought up to the standard level.

9. IC INFORMATION

● µPD6374CU (SERVO CONTROL)

Pin No.	Name	I/O	Function
1	FOK	O	FOK detection signal output terminal. When "H": FOK
2	HOLD	I	Hold control input terminal. "H": holds tracking output.
3	TBC	I	Tracking bank selecting terminal. When logical addition with internal resistor TB is "1": Bank 1.
4	CKIN	I	16 MHz clock input terminal
5	$\overline{TEST}$	I	Test terminal. Normally: "H"
6	V_{DD}		Power (+5V)
7	OUTSEL	I	Sled and spindle output format setting terminal. "H": 3 states
8	SCK	I	Serial data transfer clock input from CPU
9	SI	I	Serial data input from CPU
10	SO	O	LSI internal status output
11	$\overline{STB}$	I	Latch input from CPU
12	AO	I	Address and data selecting terminal of serial data from CPU. "L": address. "H": data.
13	$\overline{RST}$	I	Reset input terminal. "L": reset.
14	GND		GND terminal
15	LOCK	I	LOCK signal input terminal
16	MDR	I	MDR signal input terminal
17	MDF	I	MDF signal input terminal
18	WFCK	I	WFCK signal input terminal
19	RFCK	I	RFCK signal input terminal
20	A.V_{DD}		Analog system power terminal (+5V)
21	EFM	O	EFM signal output terminal after asymmetry compensation
22	ASY	I	Auto asymmetry control input terminal
23	RFI	I	EFM comparator RF signal input terminal
24	REFOUT	O	A/D converter middle point potential output terminal
25	A GND		Analog system GND terminal
26	RF	I	RF signal input terminal for FOK and MIRR generation
27	FE	I	Focus error signal input terminal
28	TE	I	Tracking error signal input terminal
29	VR	I	Middle point potential input terminal
30	A.V_{DD}		Analog system power terminal (+5V)
31	TEC0	I	Tracking comparator input terminal 0
32	TEC1	I	Tracking comparator input terminal 1

Pin No.	Name	I/O	Function
33	VDD		Power source terminal (+5V)
34	FF	O	Focus drive output terminal
35	FR	O	Focus drive output terminal
36	TF	O	Tracking drive output terminal
37	TR	O	Tracking drive output terminal
38	GND		GND terminal
39	SF	O	Carriage drive output terminal
40	SR	O	Carriage drive output terminal
41	MF	O	Spindle drive output terminal
42	MR	O	Spindle drive output terminal
43	VDD		Power source terminal (+5V)
44	T_7	I	Test terminal. Normally: GND
45	T_6	I	Test terminal. Normally: GND
46	T_5	I	Test terminal. Normally: GND
47	T_4	I	Test terminal. Normally: GND
48	MIRR	O	MIRR detection signal output terminal

● μPD6375CU (DATA PROCESSOR)

Pin No.	Name	I/O	Function
1	C1D1	O	Output terminal indicating C1 error correct condition
2	D1D2		
3	C2D1	O	Output terminal indicating C2 error correct condition
4	C2D2		
5	NC	–	NC (Non Connection) terminal
6	STBY	I	Standby input terminal. Stops clock oscillation.
7	PLK1	O	VCO output terminal used for analog PLL selection
8	VDD		VDD terminal
9	PLK8	I	VCO clock input terminal used for analog PLL selection. Bit clock playback PLL can be composed by controlling external VCO circuit with phase comparing information of POUT output terminal. When analog PLL is selected, bit clock can be obtained by dividing the input clock to a half.
10	PLCK	O	Bit clock monitor terminal. When PLCK falling edge and EFM rising and falling edges are locked, becomes approx. 4.3 MHz.
11	Vss		GND terminal
12	POUT	O	Output terminal of phase comparing information between EFM signal and bit clock
13	WFCK	O	Bit clock frequency dividing signal indicating 1 frame period (approx. 7.35 kHz)
14	VDD		VDD terminal
15	MD	O	When MDF is "H": "H", when MDR is "H": "L", otherwise: high impedance output.
16	MDF	O	Output terminal for positive direction in CLV servo control of spindle motor. Output is selected to the clock for CLV control to μPD6374GH in μPD6374 mode.
17	MDR	O	Output terminal for negative direction in CLV servo control of the spindle motor
18	LOCK	O	In EFM demodulation part, when sync signal and output of frame counter coincide: "H". When do not coincide: "L".
19	$\overline{\text{RST}}$	I	Reset signal input terminal. When power turned on or standby mode released, inputs the reset signal of low active.
20	A0	I	Control signal to discriminate the data from microprocessor. A0="L": command A0="H": parameter
21	$\overline{\text{STB}}$	I	Signal to latch the serial data fed from SI terminal to LSI inside
22	SO	O	Output terminal for serial data. SO output is changed at falling edge of $\overline{\text{SCK}}$. When a command is given to servo LSI (μPD6374GH), becomes high impedance.
23	SI	I	Data input terminal from microprocessor. Input data by synchronizing with $\overline{\text{SCK}}$ falling edge.
24	Vss		GND terminal
25	$\overline{\text{SCK}}$	I	Clock input terminal to input and output serial data. input and output of serial data for SI and SO are operated by synchronizing with this clock.
26	Tx	O	Data output terminal for digital audio interface
27	MUTE/EMPH	O	Decode signal of mute command from microprocessor or output terminal for pre–emphasis information in sub–Q code. When microprocessor MUTE output is selected during MUTE ON, or when EMPH output is selected during emphasis application, high level is output.
28	SFSY	O	Signal to indicate 1 frame period of subcode. Normally, 1 period=136 μs
29	SBSY	O	Signal to indicate the block top of subcode.
30	SBCK	I	Clock input terminal to read subcode data. Subcode data is shifted out at rising edge of this clock.
31	SBSO	O	Subcode data output terminal. Synchronizes the subcode (P through W) with rising edge of SBCK from this terminal and outputs the signal as bit serial form.
32	VDD		VDD terminal

Pin No.	Name	I/O	Function
33	$\overline{XTAL}$	–	Oscillator connection terminal
34	XTAL		
35	Vss		GND terminal
36	C16M	O	Oscillation clock output terminal. It can be used as master clock (16.9344 MHz) of servo LSI (μPD6374GH).
37	VDD		VDD terminal
38	C4M	O	1/4 frequency–divided output terminal of oscillation clock (4.2336 MHz)
39	FLAG	O	Flag signal to indicate that the audio data which is currently output is comprised of data impossible to correct. CD mode: Outputs high level when there is an error in high or low order 8 bit. CDROM mode: Outputs against each 8 bit of high and low order.
40	SCKO	O	Clock output terminal against audio serial data
41	DOUT	O	Output terminal of the serial audio data
42	LRCK	O	Signal to discriminate whether a data output from DOUT terminal is left channel or right channel. 44.1 kHz, duty 50%. "L": left channel. "H": right channel.
43	WDCK	O	Output terminal of double frequency signal of LRCK. (88.2 kHz, duty 50%) In normal mode, the falling edge is synchronized with the changing point of LRCK.
44	C4LR	O	Output terminal of four times frequency signal of LRCK. (176.4 kHz, duty 50%). Falling edge is synchronized with the changing point of WDCK.
45	RFCK	O	Frequency divided signal of oscillation clock, and output terminal of the signal indicating 1 frame sync (7.35 kHz). It is used as the phase comparing signal of CLV servo control with WFCK signal.
46	EFMI	I	Input terminal of EFM signal
47	TEST	I	Test terminal
48	Vss		GND terminal

● PD2026A (D/A CONVERTER)

Pin No.	Name	I/O	Function	Remarks
1	$P/\overline{S}$	I	Serial or parallel control selecting terminal	With pull–up resistor
2	RZ	O	R channel digital zero detection output terminal	
3	$\overline{TEST}$	I	Test terminal. Used in "H" normally.	With pull–up resistor
4	VDA		Analog power terminal for R channel DA converter	
5	RO	O	R channel data non–inverted output terminal	
6	$\overline{RO}$	O	R channel data inverted output terminal	
7	GNDA		Analog ground terminal for R channel DA converter	
8	GNDA		Analog ground terminal for L channel DA converter	
9	$\overline{LO}$	O	L channel data inverted output terminal	
10	LO	O	L channel data non–inverted output terminal	
11	VDA		Analog power terminal for L channel DA converter	
12	GNDX		Oscillation part ground terminal	
13	XI	I	Crystal oscillator connecting terminal	
14	XO	O	Generates required clock for system with crystal oscillator connected.	
15	VDX		Oscillation part power terminal	
16	GND		Logic part ground terminal	
17	C	I	Clock selecting terminal. "L"=256 fs. "H"=384 fs.	With pull–up resistor
18	LZ	O	L channel digital zero detection output terminal	
19	MCK	O	System clock output terminal	
20	LATCH (EM1)	I	Data latch signal input terminal for attenuator when serial control De–emphasis filter mode selecting terminal when parallel control	With pull–up resistor
21	SHIFT (EM2)	I	Shift clock input terminal for attenuator when serial control De–emphasis filter mode selecting terminal when parallel control EM1 L L H H EM2 L H L H Mode 44.1 OFF 48 32 (kHz)	
22	ATT (MUTE)	I	Data input terminal for attenuator when serial control Muting terminal when parallel control. "H": mute on	
23	OSCE	I	System clock control terminal Stops the system clock in "L".	With pull–up resistor
24	$\overline{RESET}$	I	Reset terminal. When "L": resets the Σ Δ circuit and makes the attenuation data "00" (HEX).	With pull–up resistor
25	DATA	I	Data input terminal	
26	BCK	I	Bit clock input terminal	
27	LRCK	I	LR clock input terminal (L channel data when "H")	
28	VDD		Logic part power terminal	

10. CIRCUIT DESCRIPTION

10.1 PREAMPLIFIER

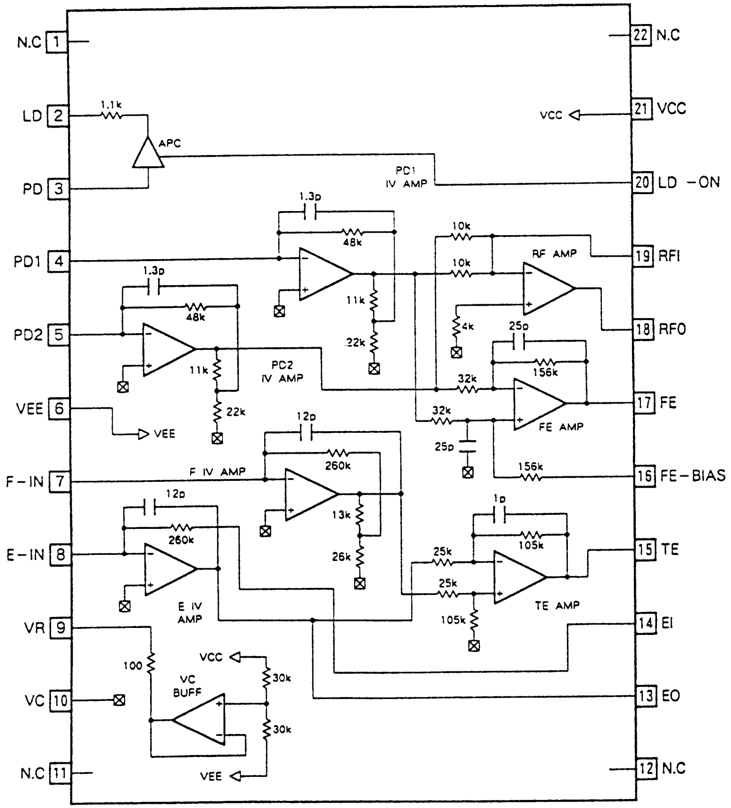
Preamplifier section processes pickup output signal and generates signals to the servo section.

Each servo system of the product consists of digital circuits. A/D converter performs processing by 1/2 Vcc (VREF) as reference voltage. Therefore, preamplifier section is operated by 5V single power and output each signals so that 1/2 Vcc (VREF) is neutral.

Its primary component is an IC CXA1471S (IC101). A description of each section follows.

The internal configuration of CXA1471S is shown in Fig. 10–1.

IC101 CXA1471S



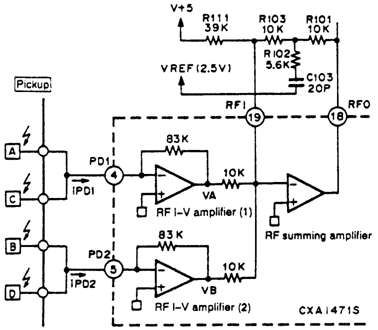
N.C 1
LD 2
PD 3
PD1 4
PD2 5
VEE 6
F-IN 7
E-IN 8
VR 9
VC 10
N.C 11
22 N.C
21 VCC
20 LD -ON
19 RFI
18 RFO
17 FE
16 FE-BIAS
15 TE
14 EI
13 EO
12 N.C
1.1k
APC
VCC
PD1 IV AMP
PD2 IV AMP
RF AMP
FE AMP
F IV AMP
E IV AMP
TE AMP
VC BUFF
1.3p
48k
11k
22k
10k
4k
25p
156k
32k
12p
260k
13k
26k
1p
105k
25k
100
30k
VEE

Fig. 10–1.

10.1.1 RF Amplifier

The output of the photodiode that is input to the input pins (PD1 and PD2) is respectively subjected to I–V conversion into a 83 kΩ equivalent resistor at the RF I–V amplifiers (1) and (2). Furthermore, addition is performed at the RF summing amplifier so that the output voltage which has been converted from the currents of the photodiodes (A+B+C+D) is output to Pin RFO. An eye pattern check can be performed at this pin.

C103 and R101 through R103 raise the high-range gain characteristics (above 1 MHz) of the RF amplifier inside the IC. As a result, the amplitude of high range signals such as 3T of RF is raised. So, signal is detected more accurately.



V+5
R111 39K
R103 10K
R101 10K
R102 5.6K
VREF (2.5V)
C103 20P
Pickup
RFI
RFO
19
18
A
C
B
D
PD1
PD2
4
5
IPD1
IPD2
83K
10K
VA
VB
RF I–V amplifier (1)
RF I–V amplifier (2)
RF summing amplifier
CXA1471S

Fig. 10–2

The low–frequency component of the RFO output voltage VRFO is as follows:

$$V_{RFO} = 2.0 \times (V_A + V_B)$$
$$= 166k \times (i_{PD1} + i_{PD2})$$

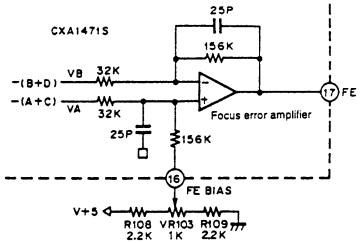
10.1.2. Focus Error Amplifier

This amplifier obtains the difference between the output (VA) of the RF I–V Amplifier (1) and the output (VB) of the RF I–V Amplifier (2), then outputs the voltage which has been converted from the currents of the photodiodes [A+C–(B+D)].

The FE output voltage (low frequency) is as follows:

$$V_{FE} = 4.9 \times (V_A - V_B)$$
$$= 400k \times (i_{PD1} - i_{PD2})$$

This output corresponds to the sum and difference of the opposite angles of the 4–division detector which cause a focus error (what is called S curve).



CXA1471S
25P
156K
VB
32K
-(B+D)
-(A+C)
VA
32K
25P
156K
17
FE
Focus error amplifier
16
FE BIAS
V+5
R108 2.2K
VR103 1K
R109 2.2K

Fig. 10–3

10.1.3. Tracking Error Amplifier

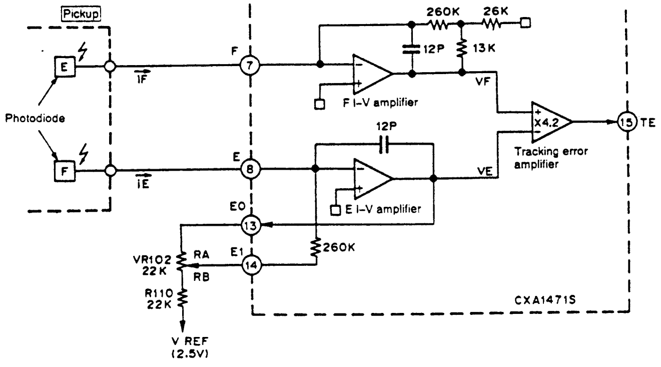

Pickup
Photodiode
E
F
IF
IE
F
7
E
8
EO
13
E1
14
260K
26K
12P
13K
F I-V amplifier
VF
12P
E I-V amplifier
VE
X4.2
15
TE
Tracking error amplifier
260K
VR102 22K
RA
RB
R110 22K
V REF (2.5V)
CXA1471S

Fig. 10–4

The output of photodiodes for the side spots input to pins E and F are respectively subjected to I–V conversion at the E I–V and F I–V amplifiers. That is:

$V_F = 403\ \mathrm{k\Omega} \times i_F$

$V_E = [260\ \mathrm{k\Omega} \times RA/(RB+22\ \mathrm{k\Omega}) + (RA+260\ \mathrm{k\Omega})] \times i_E$

Furthermore, the output difference between the E I–V amplifier and F I–V amplifier is obtained at the Tracking Error Amplifier. The output voltage that has been converted from currents of the photodiodes (E–F) as follows:

$V_{TE} = (V_E - V_F) \times 4.2$

$= (i_E - i_F) \times 403\ \mathrm{k\Omega} \times 4.2$

10.1.4. APC Circuit (Automatic Power Control)

The laser diode (LD) has negative thermal characteristics to increase the optical output when driven with a fixed current. It is necessary to control the current at the monitor photodiode (MD) so that a fixed output is obtained. The APC circuit is provided for the purpose.

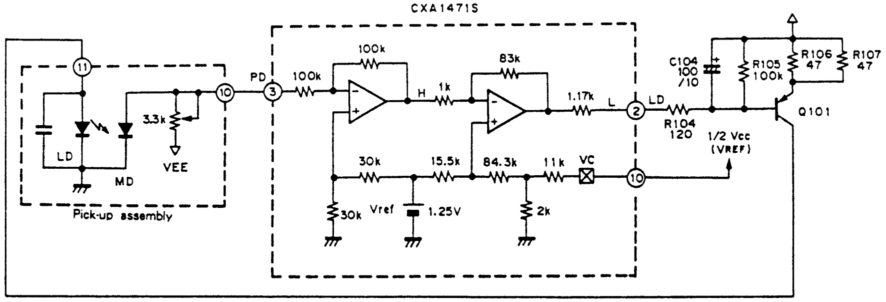

CXA1471S
11
10
PD
3
100k
100k
83k
H
1k
1.17k
L
2
LD
C104 100 /10
R105 100k
R106 47
R107 47
Q101
R104 120
1/2 Vcc (VREF)
3.3k
VEE
LD
MD
Pick-up assembly
30k
15.5k
84.3k
11k
VC
10
30k
Vref
1.25V
2k

Fig. 10–5

10.2. SERVO SECTION

All servo control is performed using the system control signal. The primary servo control systems are listed below.

1. Focus servo
2. Tracking servo
3. Carriage servo
4. Spindle servo
5. EFM–PLL servo
6. Focus–in
7. Track jump

FOK and MIRR are generated in this servo section, too. In this product, each servo, focus, tracking, carriage and spindle is performed by digital processing (digital servo). Its primary component are two ICs µP6374CU (IC151) and µPD6375CU (IC301). A description of each section follows. The internal configuration of µPD6374CU is shown in Fig. 10–6.

IC151
µPD6374CU

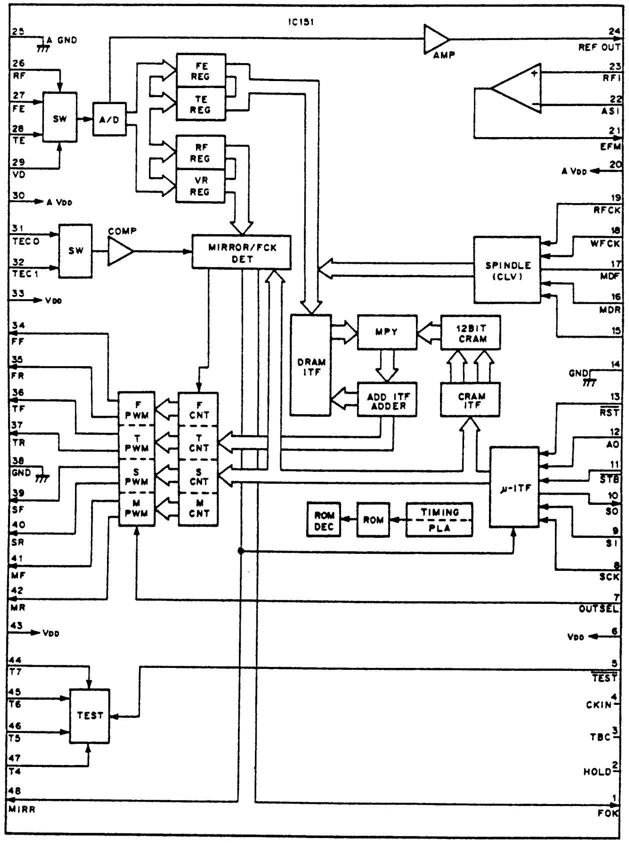

IC151
25 A GND
26 RF
27 FE
28 TE
29 VD
30 A VDD
31 TEC0
32 TEC1
33 VDD
34 FF
35 FR
36 TF
37 TR
38 GND
39 SF
40 SR
41 MF
42 MR
43 VDD
44 T7
45 T6
46 T5
47 T4
48 MIRR
SW
A/D
FE REG
TE REG
RF REG
VR REG
COMP
SW
MIRROR/FCK DET
AMP
24 REF OUT
23 RFI
22 ASI
21 EFM
20 A VDD
19 RFCK
18 WFCK
17 MDF
16 MDR
15
14 GND
13 RST
12 A0
11 STB
10 SO
9 SI
8 SCK
7 OUTSEL
6 VDD
5 TEST
4 CKIN
3 TBC
2 HOLD
1 FOK
SPINDLE (CLV)
DRAM ITF
MPY
12BIT CRAM
ADD ITF ADDER
CRAM ITF
F PWM
T PWM
S PWM
M PWM
F CNT
T CNT
S CNT
M CNT
µ-ITF
ROM DEC
ROM
TIMING PLA
TEST

Fig. 10–6. IC151 µPD6374CU

10.2.1. Focus OK Circuit

The Focus OK circuit functions to create the window for the timing of switching ON the focus Servo from Focus Search status. It is used as the DFCT (Defect) detection signal in this system.

RF signal input to pin 26 is A/D converted. Then, upper envelope is detected by digital system, and compare the detected envelope level and the reference level set by micro-computer through the detected envelope level and serial interface. If the envelope signal level is higher than reference level, output "H" to pin 1.

FOK reference level is 0.45V.

10.2.2. EFM Comparator

The EFM comparator functions to convert the RF signals into binary signals. EFM comparator circuit is shown in Fig. 10–8. The asymmetry caused by variance during disc manufacture cannot be eliminated merely by AC coupling. Consequently, the value of a binary-coded EFM signal controls the reference voltage of the EFM comparator because the respective 50% probability of a 1 or 0.

This EFM comparator is C-MOS output so that there is no need through the C-MOS buffer at the decode side as conventionally.

R308, R309, C308 and C309 serve as a LPF for obtaining the CD component of the EFM signal.

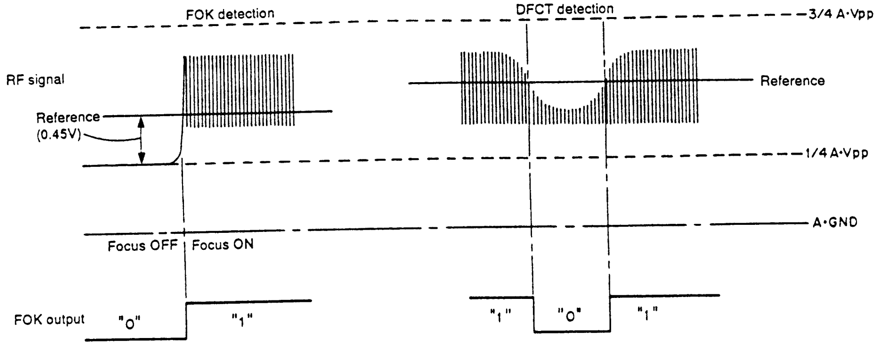

FOK detection
DFCT detection
3/4 A·Vpp
RF signal
Reference
Reference
(0.45V)
1/4 A·Vpp
A·GND
Focus OFF
Focus ON
FOK output
"0"
"1"
"1"
"0"
"1"

Fig. 10–7

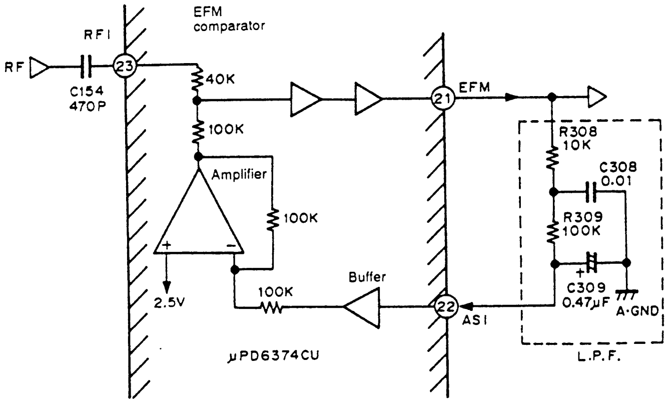

RF
RFI
C154
470P
23
EFM
comparator
40K
100K
Amplifier
100K
+
-
2.5V
100K
Buffer
21
EFM
22
ASI
R308
10K
C308
0.01
R309
100K
+
C309
0.47μF
A·GND
L.P.F.
μPD6374CU

Fig. 10–8 EFM Comparator Section

10.2.3. Mirror Circuits

Mirror detecting circuit discriminates ON and OFF track conditions by detecting mirror total reflecting condition after amplifying the envelope amplitude from RF signal. The reference to detect the lack of amplitude peak holds the envelope amplitude at enough large time constant, further, is two-thirds that of the peak value.

"L" is output to pin 48 when tracking is ON track condition, "H" is output to Pin ㊽ when tracking is OFF track or total reflection face.

When the RF signal amplitude (p-p) is 1.25V (A.V_{DD}=5V) during focus servo condition, upper and under envelope detections can follow changing till 5 kHz and 30 kHz, respectively.

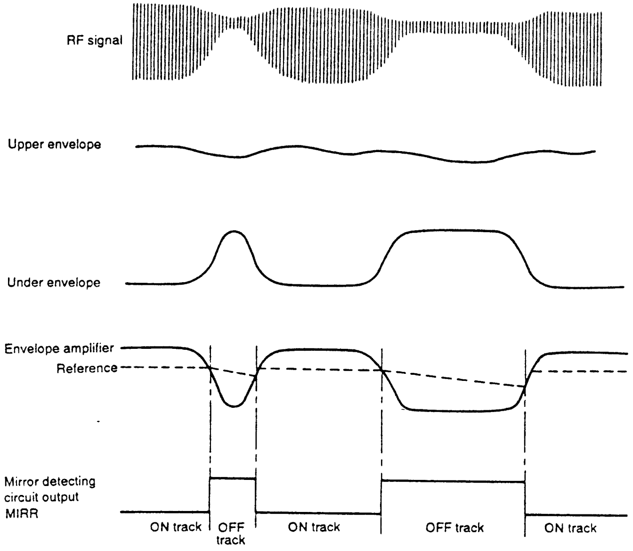

RF signal
Upper envelope
Under envelope
Envelope amplifier
Reference
Mirror detecting
circuit output
MIRR
ON track
OFF
track
ON track
OFF track
ON track

Fig. 10–9 Mirror Detection

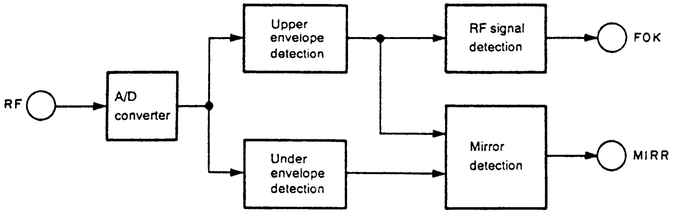
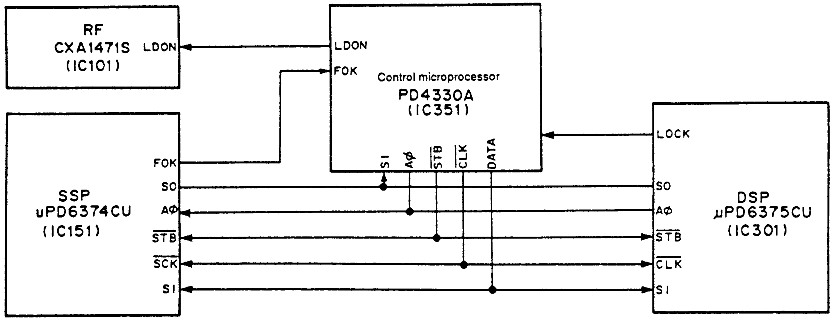

RF
A/D
converter
Upper
envelope
detection
Under
envelope
detection
RF signal
detection
Mirror
detection
FOK
MIRR

Fig. 10–10. RF Detection, Mirror Detecting Circuit Block Chart

10.2.4 CPU Interface

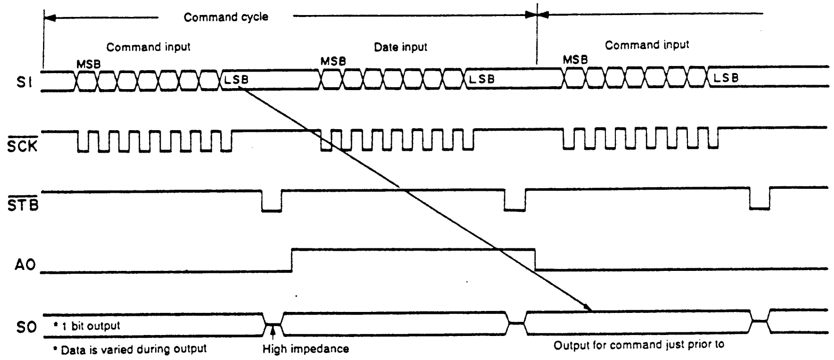
The servo control of the product is performed by common serial bus, and connected to DSP (µPD6375CU) and SSP (µPD6374CU) with wired OR circuit. Through this bus, SUB-CODE Q data is read out by microprocessor using Q data read out command. Serial interface connection is shown in Fig. 10–11.

The serial data consists of 8 bit command address and data, and is transferred by $\overline{SCK}$ clock in the form of MSB first. Aϕ is a signal discriminating command and data. When "H", data is transferred. When "L", command is transferred. S0 is the response signal from servo side (µPD6374CU) for command. Terminate signal of auto sequence (automatic focusing and track jump) and Q data from µPD6375CU are output. The timing chart of serial interface is shown in Fig. 10–12. This product is digital servo and the coefficient for digital processing is set by the microprocessor for SSP (µPD6374CU) via the bus.



RF
CXA1471S
(IC101)
LDON
LDON
FOK
Control microprocessor
PD4330A
(IC351)
SI
AΦ
STB
CLK
DATA
LOCK
SSP
uPD6374CU
(IC151)
FOK
SO
AΦ
STB
SCK
SI
SO
AΦ
STB
CLK
SI
DSP
µPD6375CU
(IC301)

Fig. 10–11



Command cycle
Command input
Date input
Command input
MSB
LSB
MSB
LSB
MSB
LSB
SI
SCK
STB
AO
SO
* 1 bit output
* Data is varied during output
High impedance
Output for command just prior to

Fig. 10–12

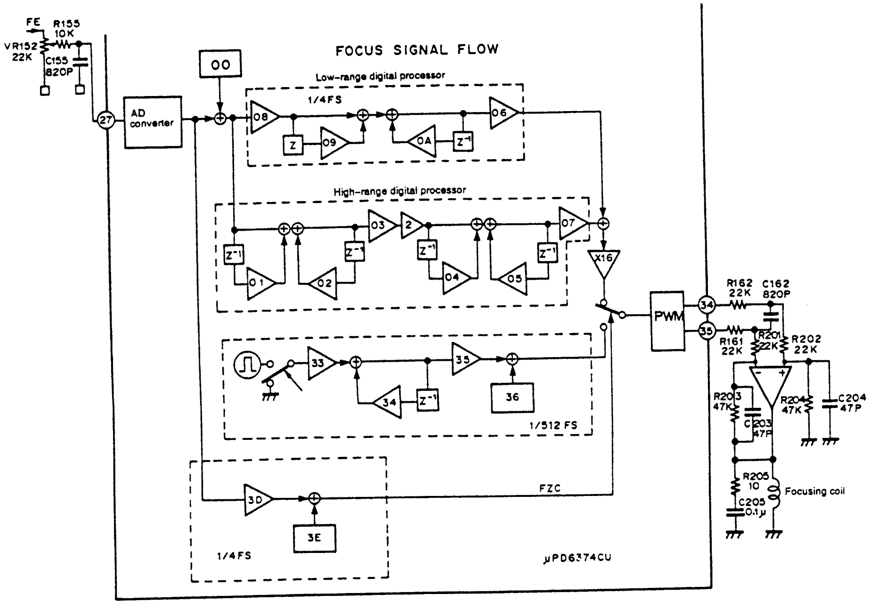
10.2.5 Meaning of Command Code

The meaning of CPU interface is described in table. 10–1.

Command code	Subject of LSI	Meaning and function
$00	µPD6374CU	Sets coefficient value of digital processor for determining each servo EQ characteristic.
$01	µPD6374CU	Sets coefficient address of digital processor for determining each servo EQ characteristic.
$10	µPD6374CU	Track jump control command
$11	µPD6374CU	Each servo ON/OFF control and automatic focusing
$13	µPD6374CU	Sets FOK reference level.
$20	µPD6374CU	Sets kick height at each track jump.
$21	µPD6374CU	Sets brake height at each track jump.
$22	µPD6374CU	Sets kick time at each track jump.
$23	µPD6374CU	Sets brake time at each track jump.
$24	µPD6374CU	Sets the number of jump track of track jump.
$25	µPD6374CU	Sets carriage kick level.
$F0	µPD6375CU	Audio control and PLL method selection
$F1	µPD6375CU	Spindle control
$F2	µPD6375CU	Q data and peak data read out command
$F7	µPD6375CU	Function select command, double speed, zero cross mute, etc.
$F8	µPD6375CU	No operation

Table 10–1.

10.2.6 Focus Servo Circuit


FOCUS SIGNAL FLOW
FE
R155 10K
VR152 22K
C155 820P
27
AD converter
00
Low-range digital processor
1/4FS
08
Z
09
06
0A
Z⁻¹
High-range digital processor
Z⁻¹
01
02
03
2
04
05
07
X16
PWM
33
34
35
36
1/512 FS
3D
3E
FZC
1/4FS
µPD6374CU
R162 22K
C162 820P
R161 22K
R201 22K
R202 22K
R203 47K
C203 47P
R204 47K
C204 47P
R205 10
C205 0.1µ
Focusing coil

Note: Z^{-1} is 1 sampling delay

Fig. 10–13

Fig. 10–13 is a block diagram of focus servo system.

The FE signal is input to Pin ㉗ through VR152 for gain adjustment and L.P.F for anti aliasing. The input signal is converted into digital signal by A/D converter of 88.2 kHz/6 bit resolution. The signal is converted into a PWM form after low–range area's gain accessed and phase compensated by the digital processor, then output from Pins ㉞ and ㉟. Numerals in Fig. 10–13 are number of processing coefficient in the internal digital processor (DSP). By changing the coefficients stored in ROM within the microprocessor, frequency characteristic can be changed. To do this, the ROM of microprocessor should be changed. The peak frequency of phase compensation is set at approximately 1.2 kHz. The control voltage (± 0.9V) for focus search is generated by digital processing. FZC is processed by digital processor. The threshold level is set at approximately 0.4V.

Automatic Focusing

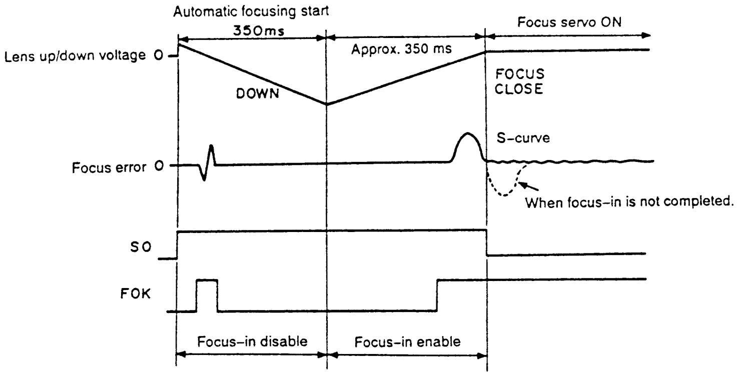


Fig. 10–15

(a) Focus–in sequence

In the focus–in sequence, the lens is driven close to the focal point on the disc surface and the servo loop is closed at the center of focus S–curve.

This sequence uses automatic sequence function build into the µPD6374CU (automatic focusing, Fig. 10–14) as shown in Fig. 10–15.

When focus–in is not possible at one time, the lens will be lowered again after its upward movement is completed, and the sequence will be repeated. If focus–in can not be succeeded after all, this operation stops after three seconds.

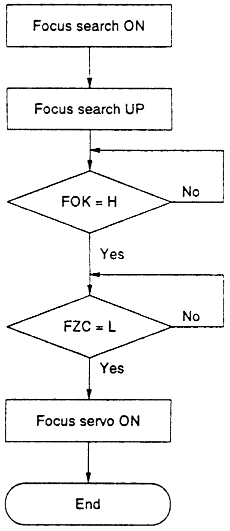
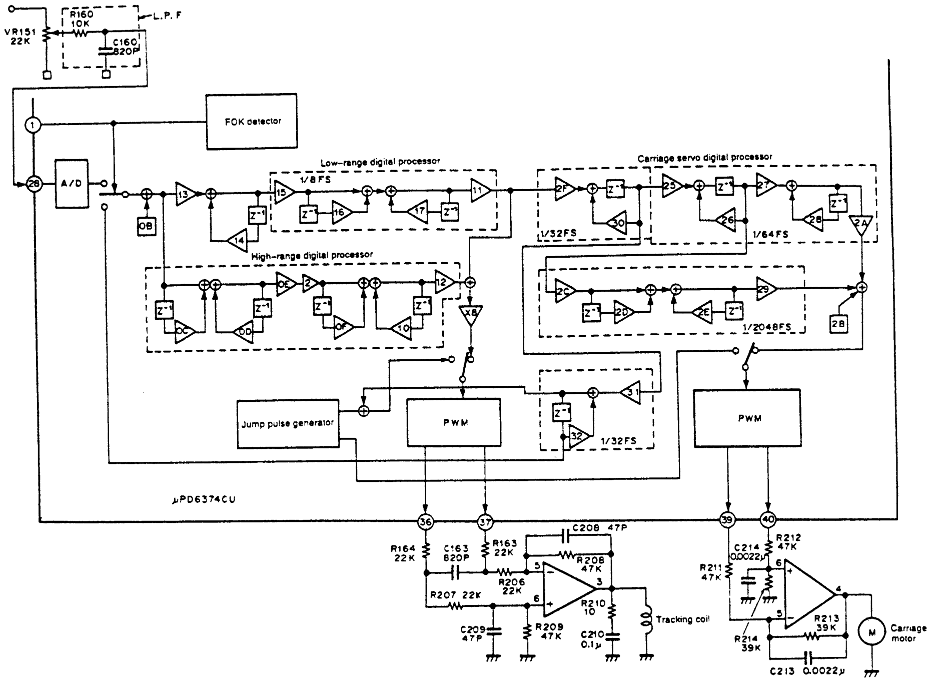

Focus search ON
Focus search UP
FOK = H
No
Yes
FZC = L
No
Yes
Focus servo ON
End

Fig. 10–14 Flow chart of Automatic Focusing

10.2.7 Tracking Servo Circuit


R160
10K
L.P.F
VR151
22K
C160
820P
FOK detector
A/D
Low-range digital processor
1/8FS
High-range digital processor
Carriage servo digital processor
1/32FS
1/64FS
1/2048FS
Jump pulse generator
PWM
PWM
1/32FS
μPD6374CU
R164
22K
C163
820P
R163
22K
C208 47P
R208
47K
R206
22K
R207 22K
R210
10
C209
47P
R209
47K
C210
0.1μ
Tracking coil
C214
0.0022μ
R212
47K
R211
47K
R213
39K
R214
39K
C213 0.0022μ
Carriage motor

Note: Z^{*-1} is 1 sampling delay

Fig. 10–16

Fig. 10–16 is a block diagram of focus servo system.

The TE signal is input to Pin ㉘ through VR151 for gain adjustment and L.P.F for anti aliasing. The input signal is converted into digital signal by 88.2 kHz A/D converter of 6 bit resolution. The TE signal converted into digital value is input to PWM modulator after low–range gain and phase compensated by the digital processor. The output of PWM modulator from Pins ㊱ and ㊲ is applied to the tracking coil after carriereliminated and power amplified.

Numerals in Fig. 10–16 are number of processing coefficient of the internal digital processor (DSP). By changing the coefficients stored in ROM within the microprocessor, frequency characteristic can be changed. To do this, the ROM of microprocessor should be changed.

The gain at jump, etc. is changed by changing the coefficients.

The peak frequency of phase compensation in normal gain is set at approximately 1.2 kHz.

The voltage of kick and brake in track jump is set by microprocessor. (Approx. 0.8V at 1–track jump and 10–track jump, approximately 1V at 50–track jump and 100–track jump.)

If FOK becomes "L" due to defective disc, etc., T.E input is changed to low–range hold and the actuator is held in the center of track.

10.2.8 Carriage Servo Circuit

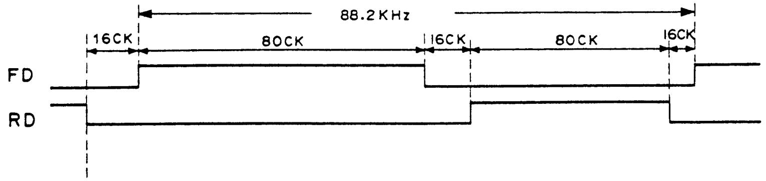
In the carriage servo circuit, only low–range component of low–range digital processor output of the tracking servo signal is extracted and input to PWM modulator. The PWM modulator is output to Pins ㊴ and ㊵, and applied to the carriage motor after carrier eliminated and power amplified.

The peak applied value at FWD, REV and track jump is determined (approx. ± 4V) by the microprocessor.

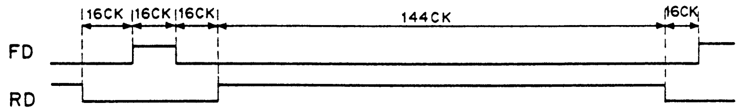
● PWM output

The output form of PWM modulator is common (Fs=88.2 kHz, 8 bit resolution) to focus, tracking, carriage and spindle. The timing chart is shown in Fig. 10–17.

1. PWM output data "0" (00 (H))


88.2KHz
16CK
80CK
16CK
80CK
16CK
FD
RD

2. PWM output data, minimum (80 (H))


16CK
16CK
16CK
144CK
16CK
FD
RD

PWM output data, maximum (7F (H))

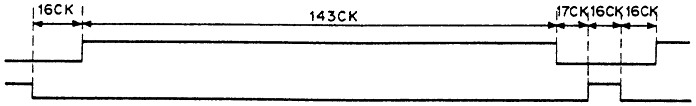
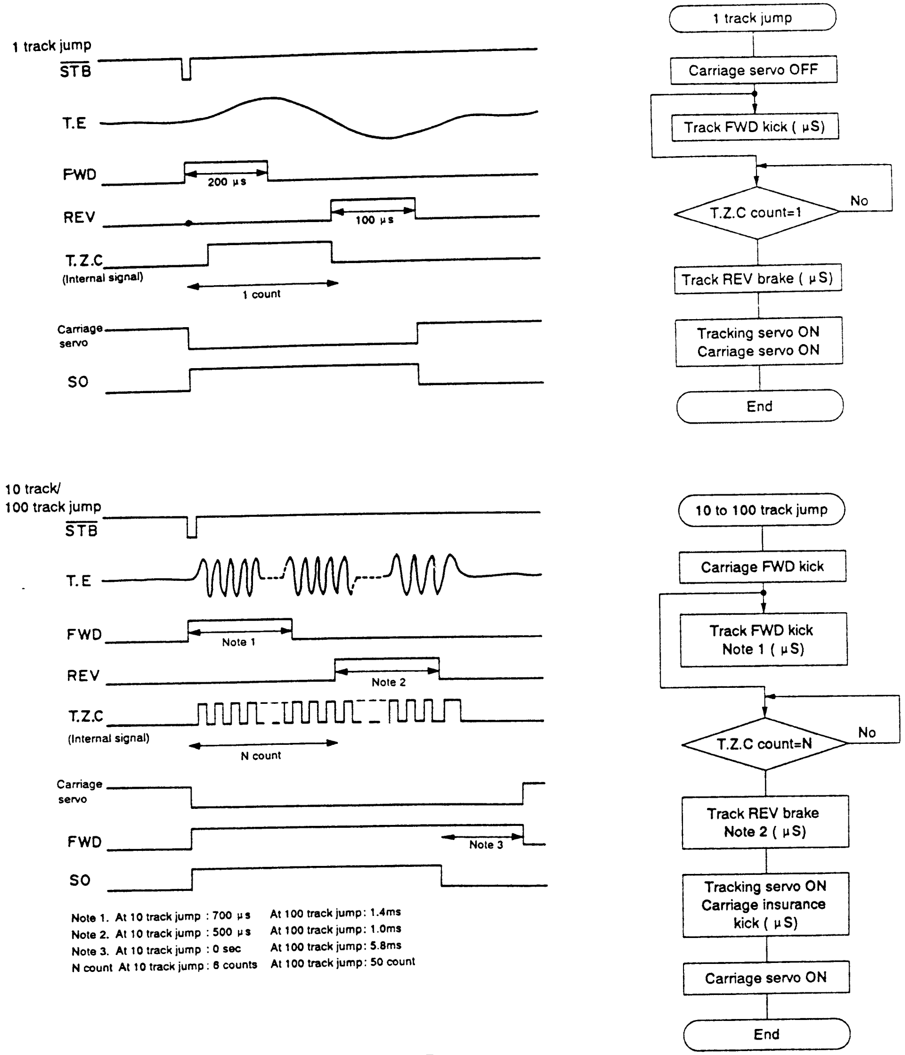

16CK
143CK
17CK
16CK
16CK

Fig. 10–17.

(a) Track Jump

An access operation, suck as track search, is performed with a combination of track count jump to roughly move the carriage and a multitrack jump to kick the tracking carriage. The multitrack jump uses N track jump functions (automatic sequence) of μPD6374CU. The timing chart is shown below.

Auto sequence timing chart


1 track jump
STB
T.E
FWD
200 μs
REV
100 μs
T.Z.C
(Internal signal)
1 count
Carriage servo
SO
1 track jump
Carriage servo OFF
Track FWD kick (μS)
T.Z.C count=1
No
Track REV brake (μS)
Tracking servo ON
Carriage servo ON
End
10 track/ 100 track jump
STB
T.E
FWD
Note 1
REV
Note 2
T.Z.C
(Internal signal)
N count
Carriage servo
FWD
Note 3
SO
10 to 100 track jump
Carriage FWD kick
Track FWD kick Note 1 (μS)
T.Z.C count=N
No
Track REV brake Note 2 (μS)
Tracking servo ON Carriage insurance kick (μS)
Carriage servo ON
End

Note 1. At 10 track jump : 700 μs At 100 track jump: 1.4ms
Note 2. At 10 track jump : 500 μs At 100 track jump: 1.0ms
Note 3. At 10 track jump : 0 sec At 100 track jump: 5.8ms
N count At 10 track jump : 8 counts At 100 track jump: 50 count

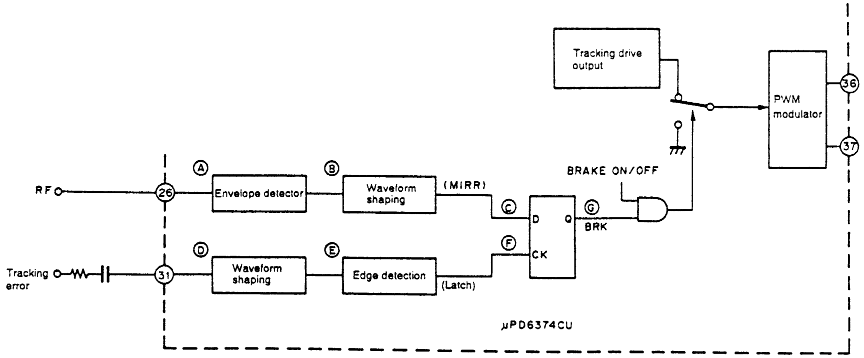
Fig. 10–18

(b) Brake mode circuit

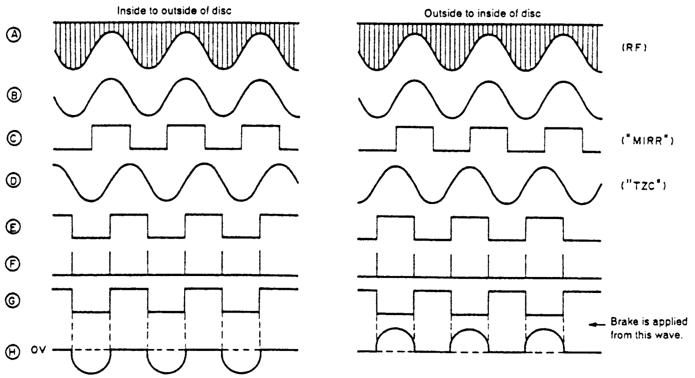
The brake mode circuit is provided to make possible the smooth closing of tracking when the lens (pickup) and track (disc) are moving in relation to each other after performing the track jump, etc.

The directions of lens and track movement are detected using the phase relationship between the envelope of RF signal and tracking error. Switching is conducted in such a way that the accelerating side of the tracking error is cut. Consequently, only the decelerating side is used. This operation is called the brake mode.

A block diagram and waveform are shown in Fig. 10–19.


Tracking drive output
PWM modulator
36
37
BRAKE ON/OFF
RF
26
A
Envelope detector
B
Waveform shaping
(MIRR)
C
D
Q
G
BRK
F
CK
Tracking error
31
D
Waveform shaping
E
Edge detection
(Latch)
μPD6374CU

Brake circuit



Each waveform

Fig. 10–19

10.2.9 Demodulator Section

The demodulator section is composed of digital signal processing LSI µPD6375CU of compact disc player, and has the following functions. The block diagram of µPD6375CU is shown in Fig. 10–20.

1. Built-in 16k RAM is included.
2. Bit clock to strobe EFM signal is generated by the digital PLL.
3. Demodulation of the EFM data.
4. Detection, protection and internal extension of the EFM sync signal.
5. Thorough error detection and correction.
   C1: double correction
   C2: double correction
6. Mute of the audio data.
7. Demodulation of the sub-code and error detection for sub-code Q data.
8. CPU interface using serial bus.
9. Output for the digital audio interface.
10. Audio peak data detection

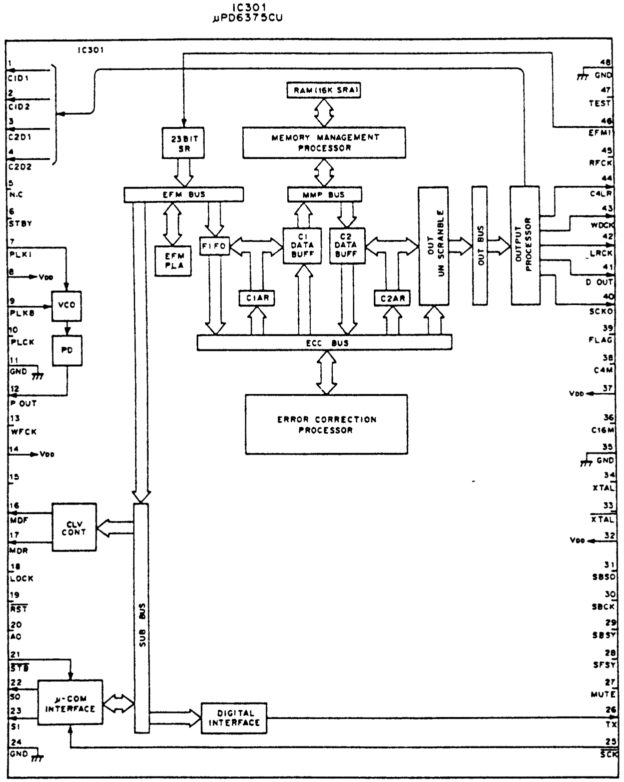

IC301
µPD6375CU
IC301
1 CID1
2 CID2
3 C2D1
4 C2D2
5 N.C
6 STBY
7 PLKI
8 VDD
9 PLK8
10 PLCK
11 GND
12 P OUT
13 WFCK
14 VDD
15
16 MDF
17 MDR
18 LOCK
19 $\overline{RST}$
20 A0
21 $\overline{STB}$
22 SO
23 SI
24 GND
48 GND
47 TEST
46 EFMI
45 RFCK
44 C4LR
43 WDCK
42 LRCK
41 D OUT
40 SCKO
39 FLAG
38 C4M
37 VDD
36 C16M
35 GND
34 XTAL
33 $\overline{XTAL}$
32 VDD
31 SBSO
30 SBCK
29 SBSY
28 SFSY
27 MUTE
26 TX
25 $\overline{SCK}$
RAM (16K SRA)
MEMORY MANAGEMENT PROCESSOR
23BIT SR
EFM BUS
MMP BUS
EFM PLA
FIFO
C1 DATA BUFF
C2 DATA BUFF
C1AR
C2AR
OUT UN SCRANBLE
OUT BUS
OUTPUT PROCESSOR
ECC BUS
ERROR CORRECTION PROCESSOR
VCO
PD
CLV CONT
SUB BUS
µ-COM INTERFACE
DIGITAL INTERFACE

Fig. 10–20. µPD6375CU Block Diagram

10.2.11 Channel Clock Reproduction by the Digital PLL Circuit

To demodulate the EFM signal reproduced by the optical system, a channel clock is required.

Defining the channel clock frequency as T, EFM signals are modulated to 3T through 11T (integral multiples of T).

To read the information of EFM signals, these integral values must be correctly read out. For this, "T" or a channel clock is required.

In actual CD players, as the rotation irregularity of the spindle changes the pulse width of EFM signals, a PLL circuit is required to activate the channel clock.

The block diagram of this PLL is shown in Fig. 10–21.

As can be found from the block diagram, the digital PLL of µPD6375CU has resolution approximately eight times of 1T (T=bit rate of EFM signal=1/4.3218 MHz). If free run of the frequency divider is performed by 1/8 of the input clock (33.8688MHz), output frequency becomes 4.2336 MHz. This value slightly differs from the bit rate of EFM signal (4.3218 MHz). Therefore, in the LSI, the frequency divider is automatically adjusted to match average free run frequency with bit rate.

If average judgment interval of EFM signal is assumed 5T, the capture range becomes approximately 1.2% since the transient disturbance of EFM signal is protected by the phase comparator.

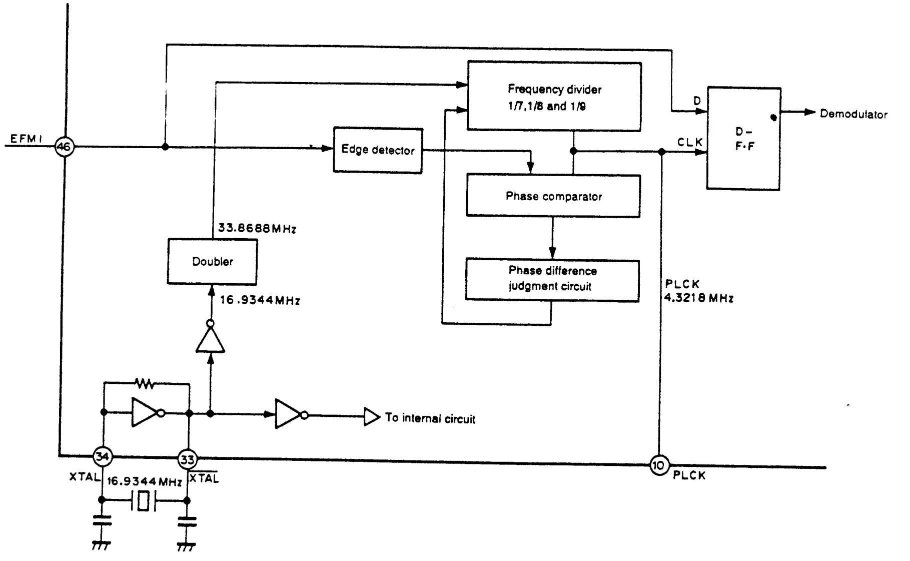

EFMI
46
Frequency divider
1/7,1/8 and 1/9
Edge detector
Phase comparator
Phase difference judgment circuit
D
CLK
D-F·F
Demodulator
33.8688MHz
Doubler
16.9344MHz
To internal circuit
PLCK
4.3218 MHz
34
33
10
XTAL
16.9344 MHz
$\overline{XTAL}$
PLCK

Fig. 10–21

10.2.12 Spindle Servo System (CLV Servo)

The CLV servo controls the rotation of the spindle for the frame sync signals in the EFM signal. Of this CLV servo, three types are available;rough servo CLV-S for tracking opening, etc., CLV-H for accessing and CLV-P for lock. In addition, there is CLV-A for automatic switching between CLV-S and CLV-P. According to the condition, the appropriate servo is activated by system control (serial).

The operations are described here taking CLV-A as an example. With CLV-S, CLV servo is activated so that the pulse width of the frame sync signal becomes 22T (when defining a cycle of 8.4672MHz as T) and the disc speed becomes almost equal to that at the PLL lock. When the clock for EFM signals on the disc reaches the specified frequency, permitting the frame sync signal to be obtained, the servo is automatically switched from CLV-S to CLV-P inside μPD6374CU. With CLV-P, the servo functions so that WFCK which generated by VCO to synchronize with EFM signals is compared and equalized with RFCK from a crystal oscillator. If CLV-P lock is released during playback, the servo is immediately switched to CLV-S and follows the above-mentioned sequence.

The spindle servo of the product is digital servo. The block diagram is shown in Fig. 10-22. Since the lock signal is almost "L" at CLV-S, the input of the digital processor is AD converter of MDF and MDR sides and "0". They are rotation controlled by MDF and MDR of decoder. The digital processor composes L.P.F for eliminating carrier of WFCK/32 component.

When shifted to CLV-P, "LOCK" becomes "H". Phase and velocity difference signal detected from "RFCK" and "WFCK" with pulse count are input to the digital processor. The result of digital processing is PWM converted by PWM modulator, then carrier eliminated and power amplified through IC201 (1/3), and applied to the spindle motor. The frequency of L.P.F by digital processing is approximately 1 kHz.

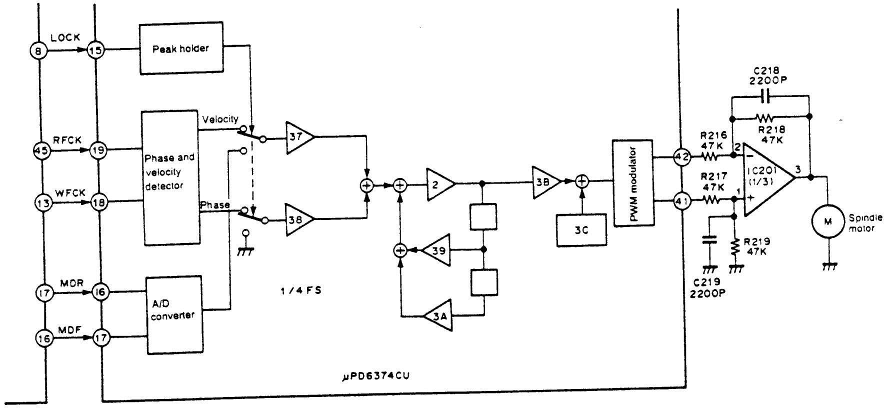


Fig. 10-22

11. FOR PD-T507/MEM, UB AND PD-T307/MEM TYPES

CONTRAST OF MISCELLANEOUS PARTS

NOTES:
- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

11.1 CONTRAST OF MISCELLANEOUS PARTS FOR PD-T507/MEM AND UB TYPES

The PD-T507/MEM and UB types are the same as the PD-T507/KC type with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PD-T507/ KC type	PD-T507/ MEM type	PD-T507/ UB type	
⊙	Mother board assembly	PWM1464	PWM1465	PWM1465	
⚠	Strain relief	CM-22C	CM-22B	CM-22B	
⚠	AC Power cord	PDG1015	PDG1003	PDG1037	
⚠	Power transformer (AC120V)	PTT1187	......	......	
⚠	Power transformer (AC220-230V)	......	PTT1188	......	
⚠	Power transformer (AC230-240V)	......	......	PTT1189	
	Display window	PAM1465	PAM1482	PAM1482	
	Operating instructions (English, French)	PRE1143	PRE1143	......	
	Operating instructions (German, Italian, Dutch, Swedish, Spanish, Portuguese)	......	PRF1043	......	
	Operating instructions (English)	......	......	PRB1137	

⊙ MOTHER BOARD ASSEMBLY (PWM1465)

The mother board assembly (PWM1465) is the same as the mother board assembly (PWM1464) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		PWM1464	PWM1465	
	D391-D394	1SS254	......	
	JA391, JA392 Jack	PKN1004	......	
	R391	RD1/6PM244J	......	
	R392	RD1/6PM102J	......	
	IC31 IC protector	......	ICP-N10	

11.2 CONTRAST OF MISCELLANEOUS PARTS FOR PD-T307/MEM TYPE

The PD-T307/MEM type is the same as the PD-T307/KC type with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		PD-T307/KC type	PD-T307/MEM type	
⊙	Mother board assembly	PWM1460	PWM1461	
	Headphone board assembly	......	Non supply	
⚠	Strain relief	CM-22	CM-22B	
⚠	Power transformer (AC120V)	PTT1187	......	
⚠	Power transformer (AC220-230V)	......	PTT1188	
⚠	AC Power cord	PDG1040	PDG1003	
	Headphone knob	......	PAC1370	
	Display window	PAM1464	PAM1481	
	Function panel assembly	PEA1125	PEA1155	
	Stopper	......	PNM1070	
	Leg assembly	PXA1201	......	
	Insulator	......	VNK1095	
	Operating instructions (German, Italian, Dutch, Swedish, Spanish, Portuguese)	......	PRF1043	

⊙ MOTHER BOARD ASSEMBLY (PWM1461)

The mother board assembly (PWM1461) is the same as the mother board assembly (PWM1460) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		PWM1460	PWM1461	
	IC406	......	BA15218	
	R445, R446	RD1/6PM681J	RD1/6PM271J	
	R447, R448	......	RD1/6PM471J	
	IC31 IC protector	......	ICP-N10	

12. SPECIFICATIONS

1. General

Type	Compact disc digital audio system
Power requirements	
European models	AC 220−230V, 50/60Hz
U.K. and Australian models	AC 230−240V, 50/60Hz
U.S., Canadian models	AC 120V, 60Hz
Other models	AC 110/120−127/220/240V (switchable), 50/60Hz
Power consumption	12W
Operating temperature	+5°C− +35°C (+41°F− +95°F)
Weight	3.6kg (7lb, 15oz)
External dimensions:	
PD-T507: U.S. Canadian, U.K. and European models, PD-T307: European model,	420(W) × 276(D) × 101(H)mm 16-9/16(W) × 10-7/8(D) × 4(H) in.
Other models	420(W) × 276(D) × 96(H)mm 16-9/16(W) × 10-7/8(D) × 3-3/4(H) in.

2. Audio section

Frequency response	2Hz−20kHz
S/N	102dB or more (EIAJ)
Dynamic range	96dB or more (EIAJ)
Total harmonic distortion	0.003% or less (EIAJ)
Output voltage	2.0V
Wow and flutter	Limit of measurement (±0.001% W.PEAK) or less (EIAJ)
Number of channels	2 channels (stereo)

3. Output terminal

- Audio line output terminals
- CD-DECK SYNCHRO terminal
- Control input/output terminals
  (PD-T307: All models,
  PD-T507: U.S. and Canadian models only)
- Headphone jack (with volume control)
  (PD-T307: U.K. and European models only,
  PD-T507: All models)

4. Functions

- Play
- Pause
- Track search
- Manual search
- Peak search
- Direct selection (PD-T507 only)
- Programmed playback
- Programmed repeat
- Pause program
- Single track repeat
- Sequential disc all track repeat
- Relay playback
- Random relay play
- Program relay play (PD-T507 only)
- Auto eject play
- Auto eject random play
- Auto eject program play (PD-T507 only)
- Random play
- Random repeat
- Auto program edit
- Compu program edit
- Digital level control (remote control: PD-T507)
- Display of a particular track
- Program hold
- Level hold (PD-T507 only)
- Timer start
- CD-deck synchro

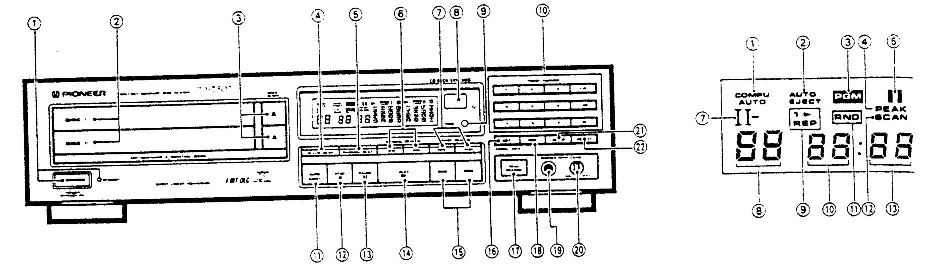
5. Accessories

● Remote control unit (PD-T507 only)	1
● Size AAA/R03 dry cell batteries (PD-T507 only)	2
● Remote control cord (PD-T507: U.S. and Canadian models) (PD-T307: All models)	1
● Output cable	1
● Operating instructions	1

NOTE:
The specifications and design of this product are subject to change without notice, due to improvements.

13. PANEL FACILITIES

PD-T507



FRONT PANEL

① POWER STANDBY/ON switch and STANDBY indicator
② Disc trays (DISC I, DISC II)
③ OPEN/CLOSE buttons
④ HI-LITE SCAN button
⑤ RANDOM PLAY button
⑥ MANUAL SEARCH buttons (◀◀, ▶▶)
⑦ TRACK SEARCH buttons (|◀◀, ▶▶|)
⑧ Remote sensor
⑨ TIME button
⑩ TRACK NUMBER buttons (1—10, +10 >20)
⑪ AUTO EJECT button
⑫ STOP button (■)
⑬ PAUSE button (❚❚)
⑭ PLAY button (▶)
⑮ Disc select buttons (DISC I, DISC II)
⑯ Program edit button (EDIT) (■ COMPU/■■ AUTO)
⑰ PEAK SEARCH button
⑱ Program button (PGM/PROGRAM)
⑲ Headphones jack (PHONES)
⑳ Headphones volume control (PHONES LEVEL)
㉑ CLEAR button
㉒ REPEAT button

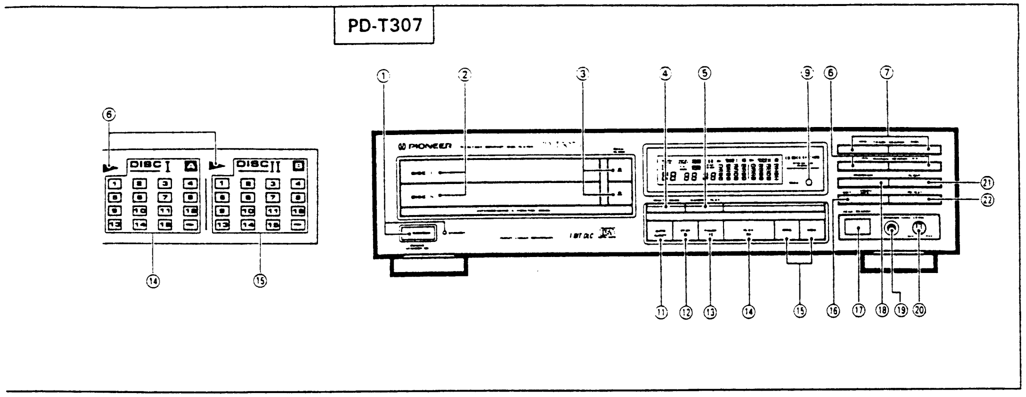
NOTE:
Items ⑲ and ⑳ are included on the U.K. and European models of the PD-T307.

PANNEAU AVANT

① Interrupteur et témoin d'alimentation en attente/activée (POWER STANDBY/ON)
② Plateau de disque (DISC I, DISC II)
③ Touche d'ouverture/fermeture (OPEN/CLOSE)
④ Touche de HI-LITE SCAN
⑤ Touche de lecture aléatoire (RANDOM PLAY)
⑥ Touche de recherche manuelle (MANUAL SEARCH) (◀◀, ▶▶)
⑦ Touche de recherche de piste (TRACK SEARCH) (|◀◀, ▶▶|)
⑧ Capteur de télécommande
⑨ Touche de temps (TIME)
⑩ Touches de numéros de pistes (TRACK NUMBER) (1—10, +10, >20)
⑪ Touche d'éjection automatique (AUTO EJECT)
⑫ Touche d'arrêt (STOP) (■)
⑬ Touche de PAUSE (❚❚)
⑭ Touche de lecture (PLAY) (▶)
⑮ Touches de sélection de disque (DISC I, DISC II)
⑯ Touche d'édition de programme (EDIT) (■ COMPU/■■ ATUO)
⑰ Touche de recherche de crête (PEAK SEARCH)
⑱ Touche de programmation (PGM/PROGRAM)
⑲ Prise de casque (PHONES)
⑳ Commande de volume de casque (PHONES LEVEL)
㉑ Touche d'effacement (CLEAR)
㉒ Touche de répétition (REPEAT)

REMARQUE :
Les éléments ⑲ et ⑳ sont inclus sur les modèles Royaume-Uni et Europe du PD-T307.

PD-T307



DISPLAY

① Lights during use of computer allocated program editing or auto program editing.
② Lights during auto eject.
③ Lights during program input.
④ Lights during peak search.
⑤ Lights during playback pause.
⑥ Lights during playback. (DISC I or DISC II)
⑦ Indicates disc number (I or II) during playback or search.
⑧ Indicates track number (01—99) during playback or search.
⑨ Lights during repeat playback. (During single-track repeat, the [1▶] indicator also lights).
⑩ Indicates the minutes digit of the track playing time and remaining time.
⑪ Lights during random playback.
⑫ Lights during HI-LITE scan on DISC I or DISC II.
⑬ Indicates the seconds digit of the track playing time and remaining time.
⑭ Indicates the track number on DISC I.
Also indicates the track numbers for editing on side A of a cassette tape.
⑮ Indicates the track number on DISC II.
Also indicates the track numbers for editing on side B of a cassette tape.

AFFICHAGE

① S'allume pendant l'utilisation des fonctions d'édition de programme affecté par ordinateur ou d'édition de programme auomatique.
② S'allume pendant la reproduction avec éjection automatique.
③ S'allume pendant l'entrée d'un programme.
④ S'allume pendant la recherche de crête.
⑤ S'allume pendant le mode de pause.
⑥ S'allume pendant la reproduction. (DISC I ou DISC II)
⑦ Affiche le numéro de disque (I ou II) pendant la reproduction ou la recherche.
⑧ Affiche le numéro de piste (01—99) pendant la reproduction ou la recherche.
⑨ S'allume pendant la reproduction répétée.
(Pendant une reproduction répétée d'une piste unique, le témoin [1▶] s'allume aussi).
⑩ Indique le chiffre des minutes de la durée de reproduction et la durée restante de la piste en train d'être reproduite.
⑪ S'allume pendant une reproduction aléatoire.
⑫ S'allume pendant un balayage HI-LITE sur DISC I ou DISC II.
⑬ Affiche le chiffre des secondes de la durée de reproduction et de la durée restante de la piste en train d'être reproduite.
⑭ Affiche le numéro de la piste sur DISC I.
Indique également les numéros de piste pour édition sur le côté A d'une cassette.
⑮ Affiche le numéro de la piste sur DISC II.
Indique également les numéros de piste pour édition sur le côté B d'une cassette.

PIONEER
The Art of Entertainment

Service Manual

ORDER NO.
ARP2264

TWIN-TRAY COMPACT DISC PLAYER

PD-T507 UPW, SD
PD-T307 UPW, SD

- **Refer to the service manual ARP2201, PD-T507 and PD-T307.**
- **This manual is applicable to the PD-T507/UPW, SD, PD-T307/UPW and SD types.**

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PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911
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SO APR. 1991 Printed in Japan

1. CONTRAST OF MISCELLANEOUS PARTS

1.1 PD–T507/UPW AND SD TYPES

NOTES:

- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

The PD–T507/UPW and SD types are the same as the PD–T507/KC type with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PD–T507/ KC type	PD–T507/ UPW type	PD–T507 /SD type	
⊙	Mother board assembly	PWM1464	PWM1465	PWM1466	
⚠	Strain relief	CM–22C	CM–22B	CM–22B	
⚠	AC Power cord	PDG1015	PDG1006	PDG1013	
⚠	Power transformer (AC120V)	PTT1187	......	......	
⚠	Power transformer (AC230–240V)	......	PTT1189	......	
⚠	Power transformer (AC110/120–127/220/240V)	......	......	PTT1190	
⚠	Voltage selector	......	......	PSB1002	
	Stopper	PNM1070	......	......	
	Insulator	VNK1095	......	......	
	Leg assembly	......	PXA1201	PXA1201	
	Packing case	PHG1702	PHG1651	PHG1651	
	Connection cord (with mini plug)	PDE–319	......	......	
	Operating instructions (English/French)	PRE1143	......	......	
	Operating instructions (English)	......	PRB1137	PRB1137	
	Operating instructions (Spanish)	......	......	PRC1030	

⊙ MOTHER BOARD ASSEMBLY (PWM1465 and PWM1466)

The mother board assemblies (PWM1465 and PWM1466) are the same as the mother board assembly (PWM1464) with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PWM1464	PWM1465	PWM1466	
	IC31	......	ICP–N10	......	
	D391–D394	1SS254	......	......	
	C393	CCCSL101J50	......	......	
	R391	RD1/6PM244J	......	......	
	R392	RD1/6PM102J	......	......	
	L391	LAU010K	......	......	
	JA391, JA392	PKN1004	......	......	
	L1, L2	......	PTL1006	......	

1.2 PD–T307/UPW AND SD TYPES

NOTES:

- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

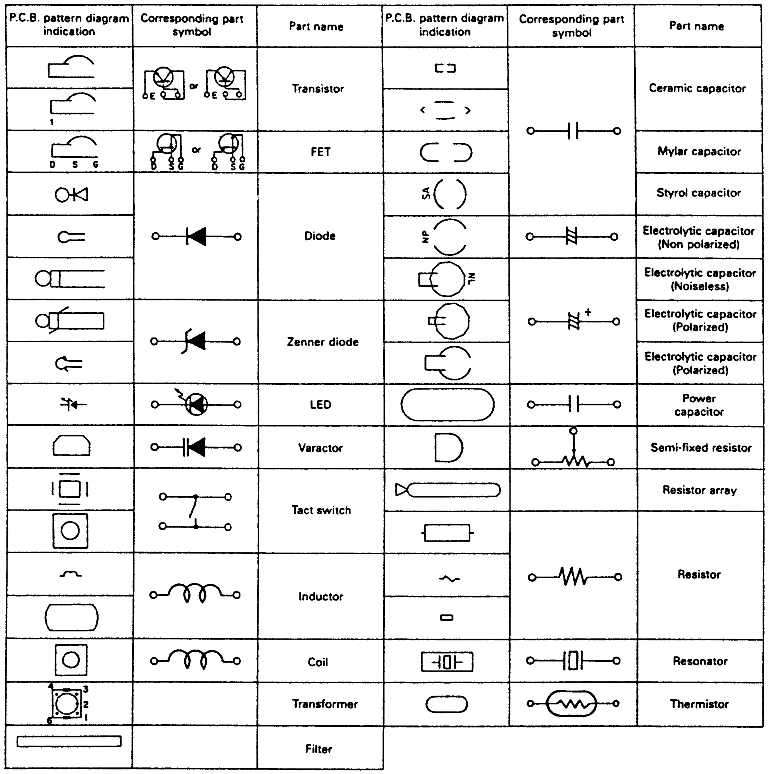
The PD–T307/UPW and SD types are the same as the PD–T307/KC type with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PD–T307/ KC type	PD–T307/ UPW type	PD–T307/ SD type	
⊙	Mother board assembly	PWM1460	PWM1460	PWM1462	
⚠	Strain relief	CM–22	CM–22B	CM–22B	
⚠	AC Power cord	PDG1040	PDG1006	PDG1013	
⚠	Power transformer (AC120V)	PTT1187	......	......	
⚠	Power transformer (AC230–240V)	......	PTT1189	......	
⚠	Power transformer (AC110/120–127/220/240V)	......	......	PTT1190	
⚠	Voltage selector	......	......	PSB1002	
	Packing case	PHG1701	PHG1652	PHG1652	
	Operating instructions (English/French)	PRE1143	......	......	
	Operating instructions (English)	......	PRB1137	PRB1137	
	Operating instructions (Spanish)	......	......	PRC1030	

MOTHER BOARD ASSEMBLY (PWM1462)

The mother board assembly (PWM1462) is the same as the mother board assembly (PWM1460) for the service supply parts.

2. P.C. BOARDS CONNECTION DIAGRAM



P.C.B. pattern diagram indication	Corresponding part symbol	Part name
	E or E	Transistor
1		
D S G	D SG or D SG	FET
		Diode
		Zenner diode
		LED
		Varactor
		Tact switch
		Inductor
		Coil
4 3 2 6 1		Transformer
		Filter

P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Ceramic capacitor
		Mylar capacitor
SA		Styrol capacitor
NP		Electrolytic capacitor (Non polarized)
NL	+	Electrolytic capacitor (Noiseless)
		Electrolytic capacitor (Polarized)
		Electrolytic capacitor (Polarized)
		Power capacitor
		Semi-fixed resistor
		Resistor array
		Resistor
		Resonator
		Thermistor

1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with O shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.

- **View from component side**

NOTE
*1 PWM1460 ONLY
*2 PWM1465 ONLY

*5

PWM1465	JUMPER
PWM1460	L1, L2

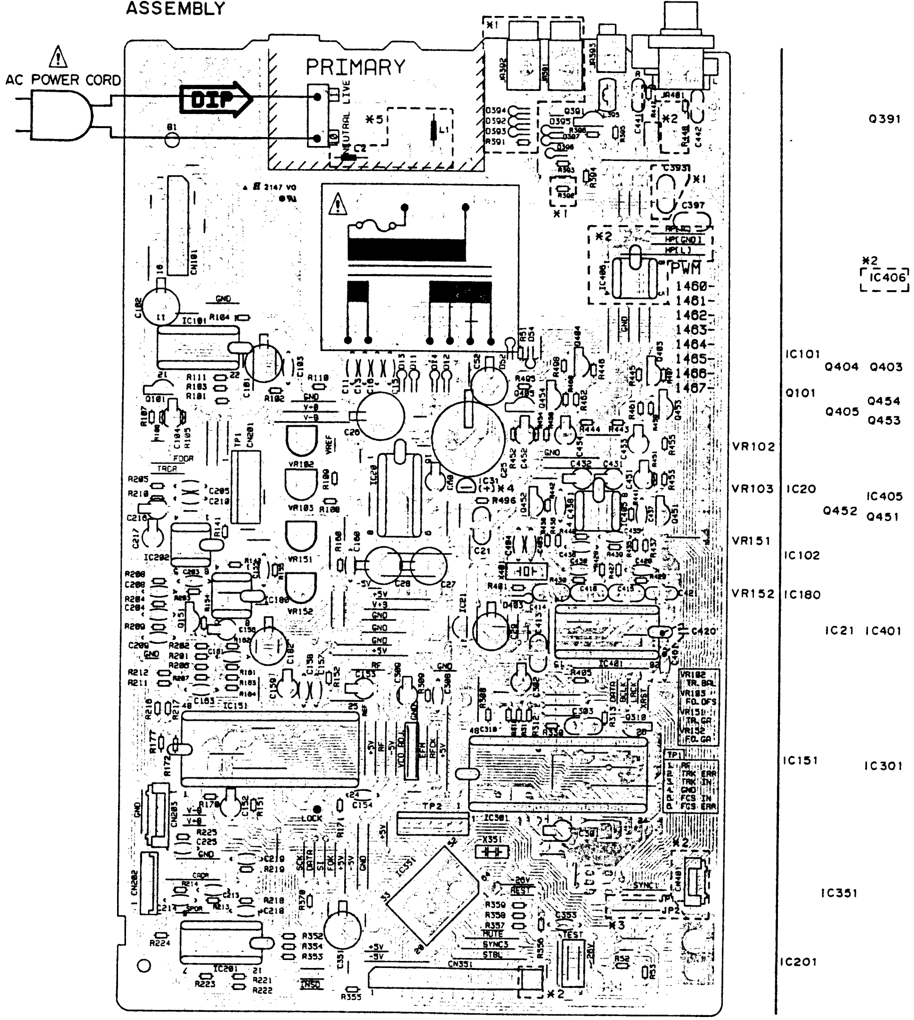
*3

	JP 1	JP 2
PWM1465	OPEN	USED
PWM1460	USED	USED

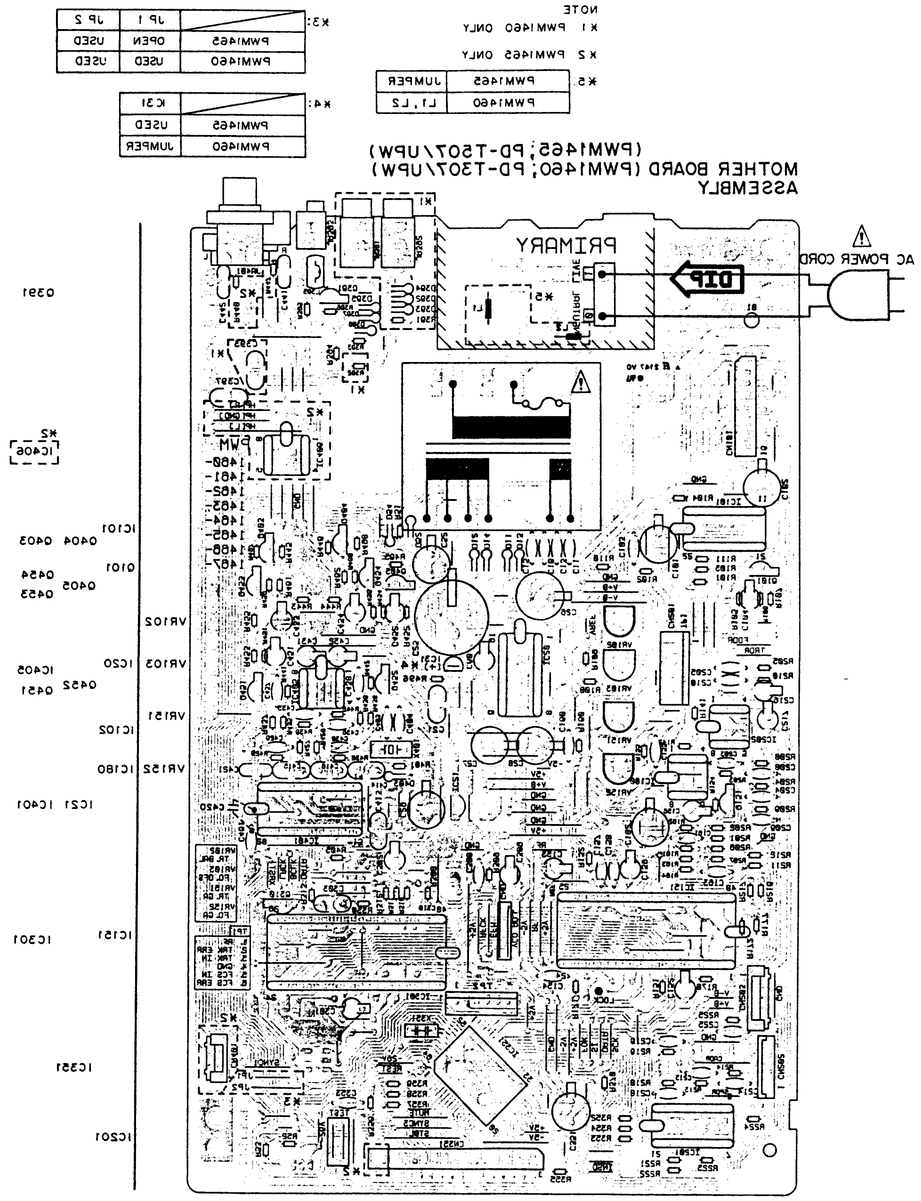
*4

	IC 31
PWM1465	USED
PWM1460	JUMPER

MOTHER BOARD (PWM1465; PD-T507/UPW)
(PWM1460; PD-T307/UPW)
ASSEMBLY


AC POWER CORD
DIP
PRIMARY
NEUTRAL LIVE
PWM 1460- 1461- 1462- 1463- 1464- 1465- 1466- 1467-
Q391
*2 IC406
IC101
Q404 Q403
Q101
Q454
Q405
Q453
VR102
VR103 IC20
IC405
Q452 Q451
VR151 IC102
VR152 IC180
IC21 IC401
IC151
IC301
IC351
IC201

- **View from soldering side**


Q391
IC406
IC101
Q404 Q403
Q101
Q454
Q405
Q453
VR102
VR103 IC20
IC405
Q452 Q451
VR151 IC102
VR152 IC180
IC21 IC401
IC151
IC301
IC351
IC201

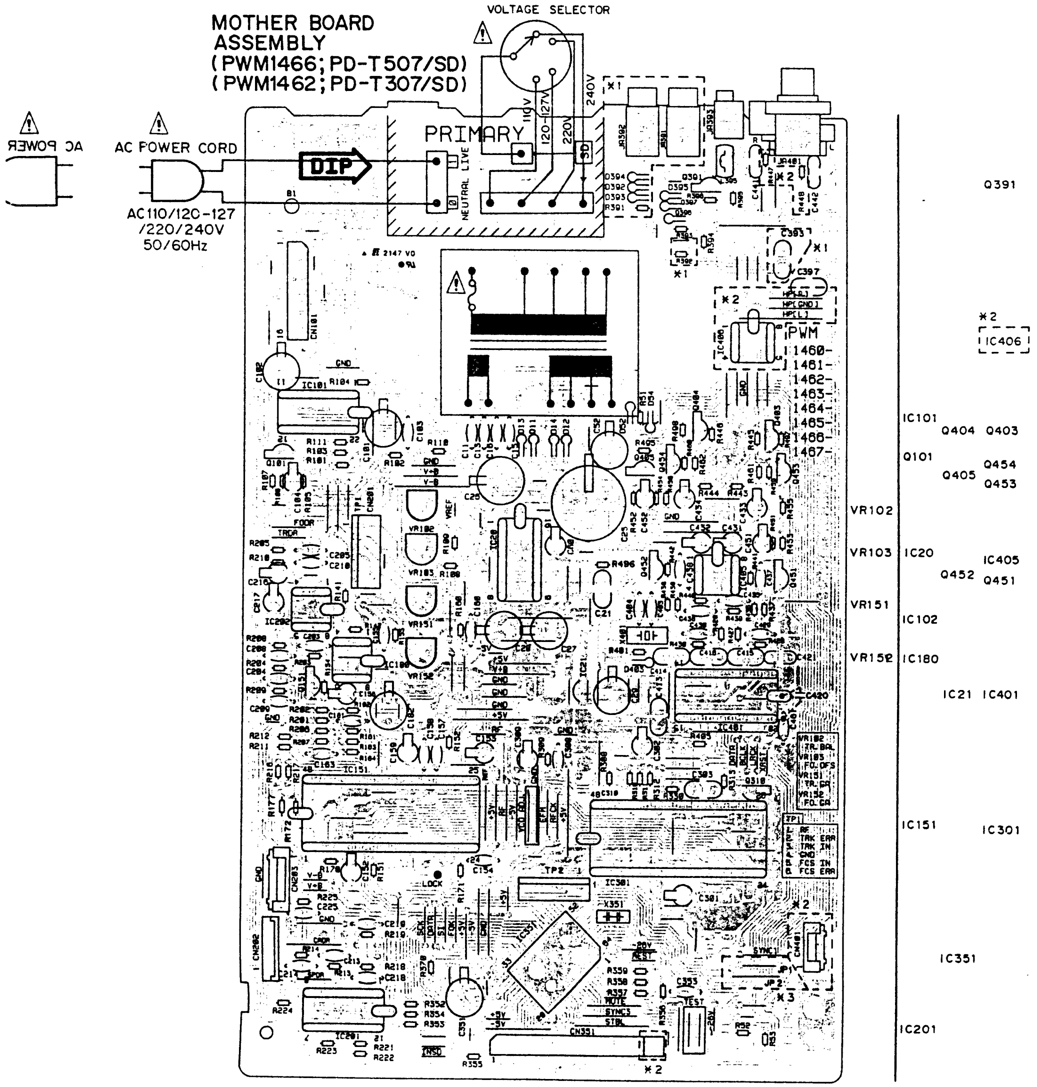
- Vi

- View from component side

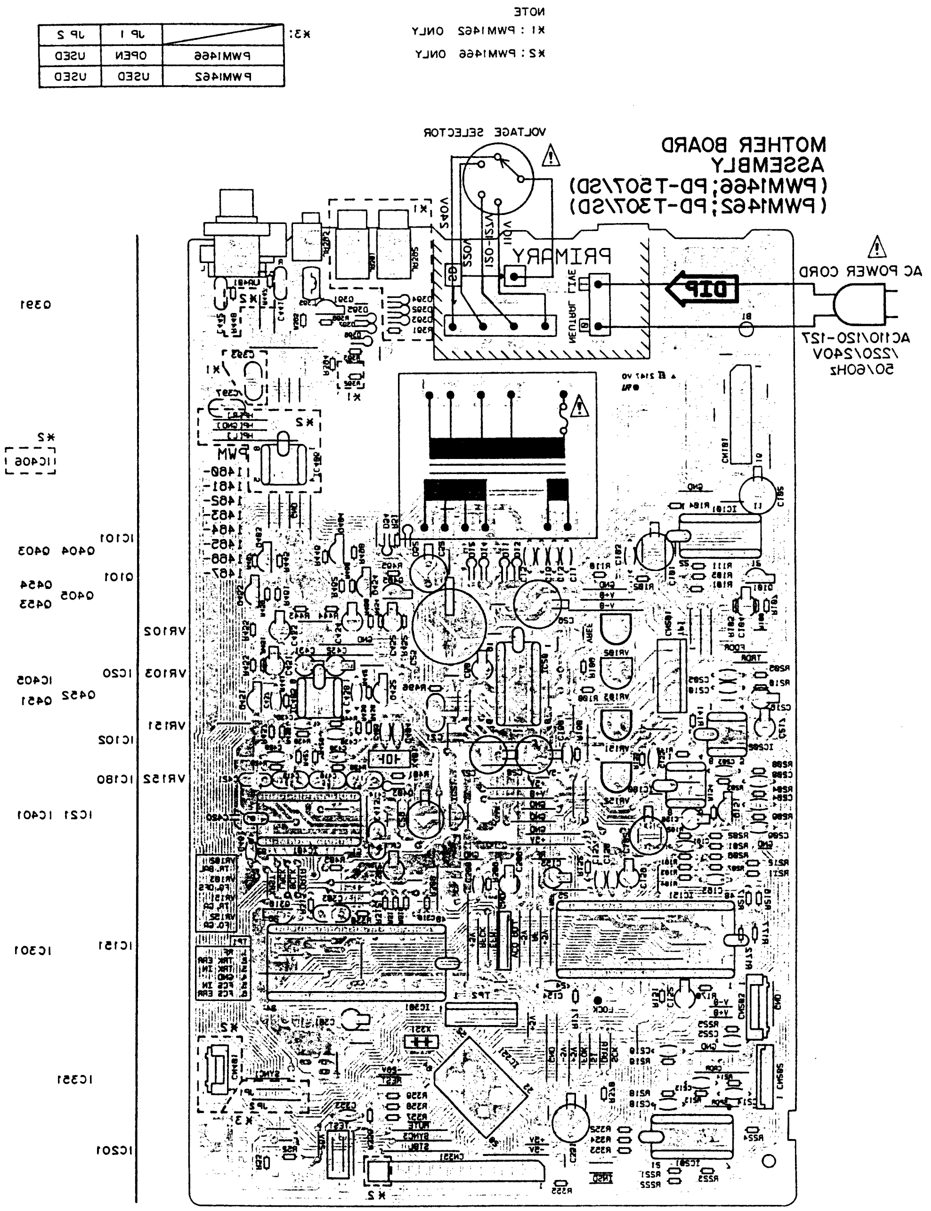
NOTE
×1 : PWM1462 ONLY
×2 : PWM1466 ONLY

×3:

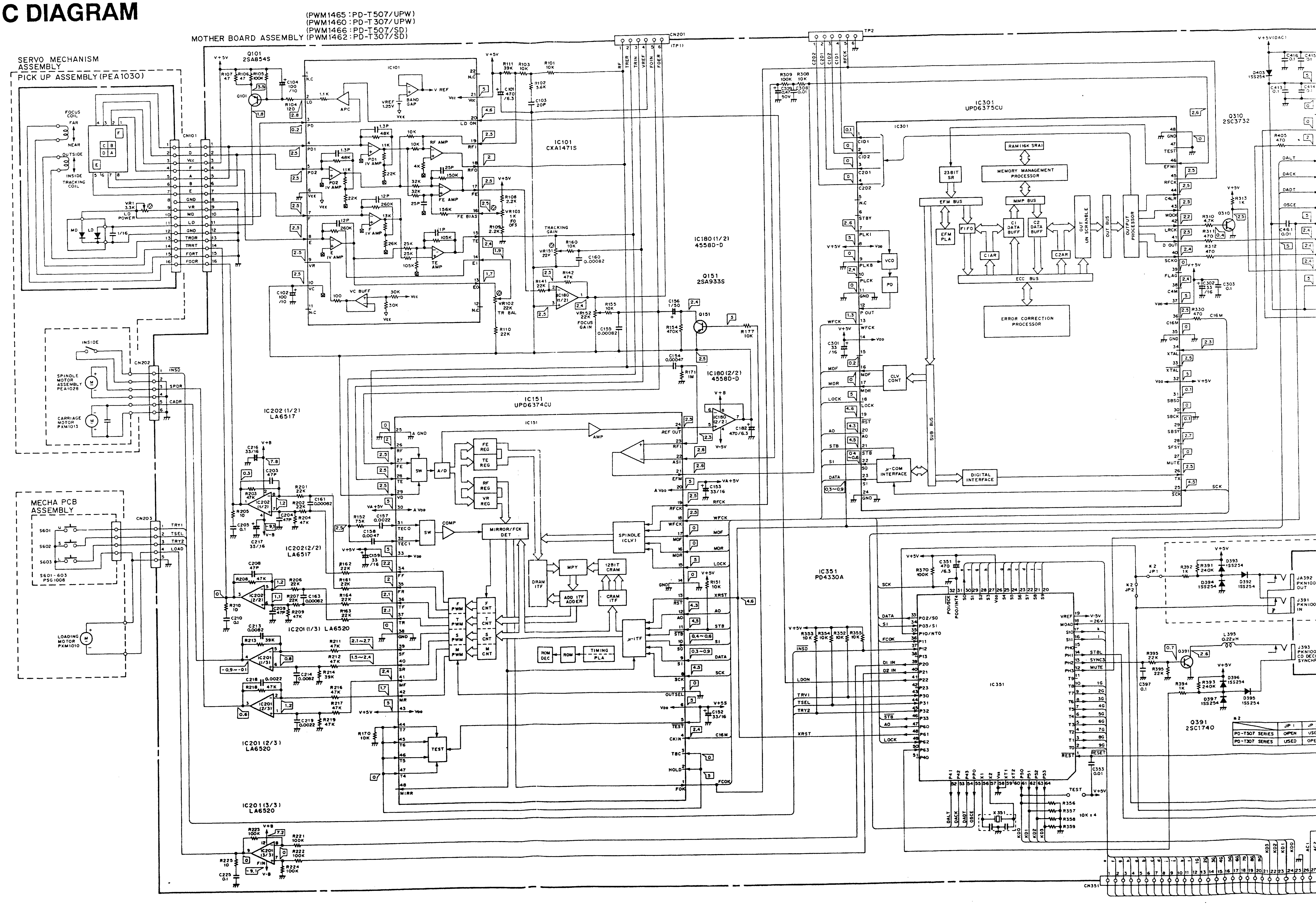
	JP 1	JP 2
PWM1466	OPEN	USED
PWM1462	USED	USED


MOTHER BOARD ASSEMBLY
(PWM1466; PD-T507/SD)
(PWM1462; PD-T307/SD)
VOLTAGE SELECTOR
AC POWER
AC POWER CORD
AC110/120-127
/220/240V
50/60Hz
DIP
PRIMARY
110V
120-127V
220V
240V
NEUTRAL
LIVE
Q391
×2
IC406
PWM
1460-
1461-
1462-
1463-
1464-
1465-
1466-
1467-
IC101
Q404
Q403
Q101
Q454
Q405
Q453
VR102
VR103
IC20
IC405
Q452
Q451
VR151
IC102
VR152
IC180
IC21
IC401
IC151
IC301
IC351
IC201

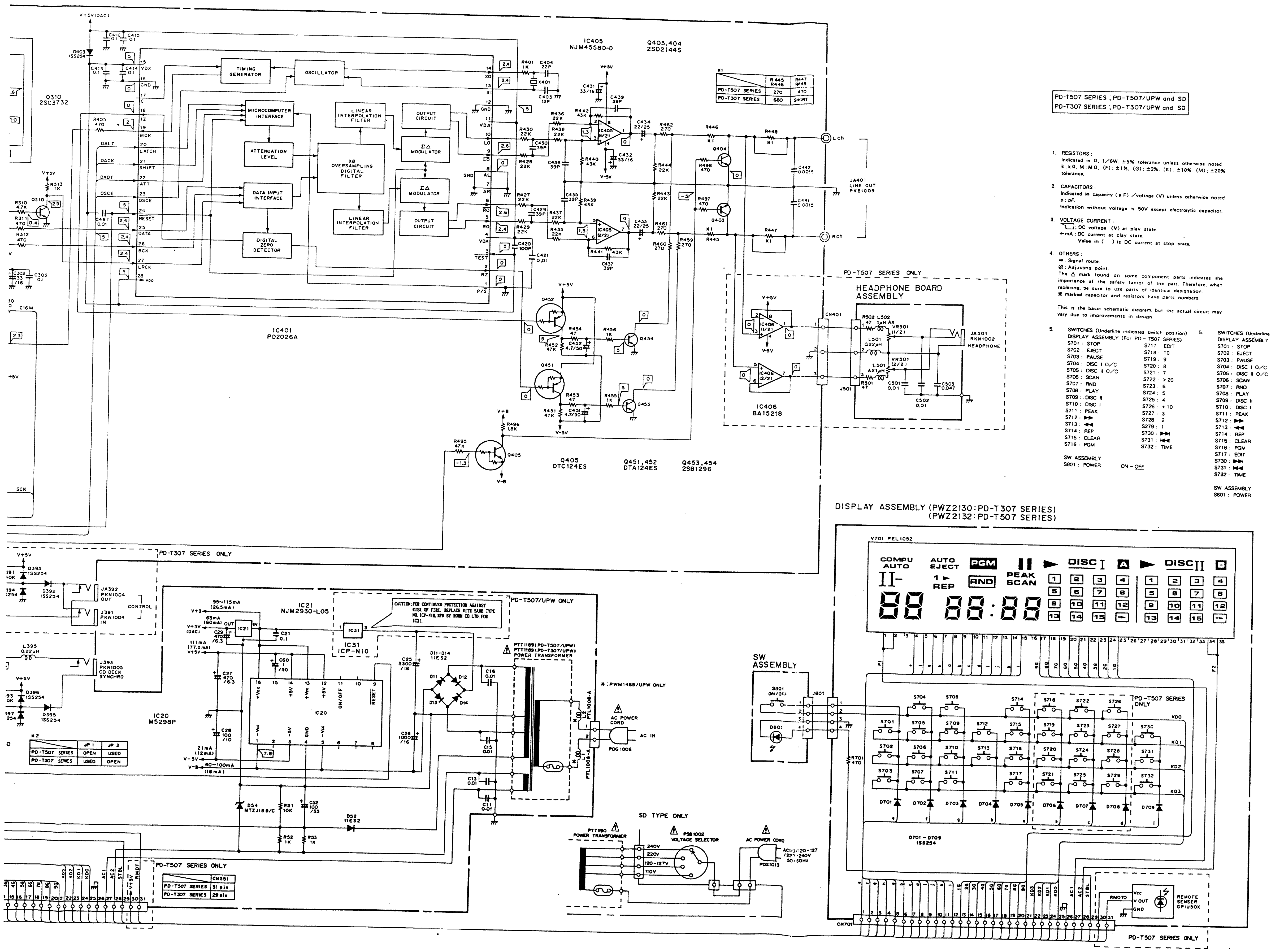
- View from soldering side



3. SCHEMATIC DIAGRAM


(PWM1465 : PD-T507/UPW)
(PWM1460 : PD-T307/UPW)
(PWM1466 : PD-T507/SD)
(PWM1462 : PD-T307/SD)
MOTHER BOARD ASSEMBLY
SERVO MECHANISM ASSEMBLY
PICK UP ASSEMBLY (PEA1030)
FOCUS COIL
FAR
NEAR
OUTSIDE
INSIDE
TRACKING COIL
VR1 3.3K
LD POWER
MD
LD
CN101
CN201
(TP1)
TP2
Q101 2SA854S
IC101 CXA1471S
APC
BAND GAP
V REF
VREF 1.25V
RF AMP
PD1 IV AMP
PD2 IV AMP
F IV AMP
E IV AMP
FE AMP
TE AMP
FE BIAS
VC BUFF
TRACKING GAIN
FOCUS GAIN
TR BAL
IC180 (1/2) 4558D-D
IC180 (2/2) 4558D-D
Q151 2SA933S
INSIDE
SPINDLE MOTOR ASSEMBLY PEA1028
CARRIAGE MOTOR PXM1013
CN202
INSD
SPDR
CADR
MECHA PCB ASSEMBLY
S601
S602
S603
S601~603 PSG1008
LOADING MOTOR PXM1010
CN203
TRY1
TSEL
TRY2
LOAD
IC202 (1/2) LA6517
IC202 (2/2) LA6517
IC201 (1/3) LA6520
IC201 (2/3) LA6520
IC201 (3/3) LA6520
IC151 UPD6374CU
A/D
SW
COMP
FE REG
TE REG
RF REG
VR REG
MIRROR/FCK DET
SPINDLE (CLV)
DRAM ITF
MPY
128 BIT CRAM
ADD ITF ADDER
CRAM ITF
ROM DEC
ROM
TIMING PLA
μ-ITF
F PWM
T PWM
S PWM
M PWM
F CNT
T CNT
S CNT
M CNT
TEST
IC301 UPD6375CU
RAM (16K SRAM)
MEMORY MANAGEMENT PROCESSOR
23 BIT SR
EFM BUS
MMP BUS
EFM PLA
FIFO
C1 DATA BUFF
C2 DATA BUFF
C1AR
C2AR
OUT UN SCRAMBLE
OUT BUS
OUTPUT PROCESSOR
ECC BUS
ERROR CORRECTION PROCESSOR
VCO
PD
CLV CONT
SUB BUS
μ-COM INTERFACE
DIGITAL INTERFACE
Q310 2SC3732
IC351 PD4330A
X351
10K x 4
Q391 2SC1740
JA392 PKN100 OUT
J391 PKN100 IN
J393 PKN100 CD DECK SYNCHRO
L395 0.22μH
CN351

K2	JP1	JP
PD-T507 SERIES	OPEN	USE
PD-T307 SERIES	USED	OPE


IC401
PD2026A
IC405
NJM4558D-D
Q403,404
2SD2144S
Q310
2SC3732
TIMING GENERATOR
OSCILLATOR
MICROCOMPUTER INTERFACE
ATTENUATION LEVEL
DATA INPUT INTERFACE
DIGITAL ZERO DETECTOR
X8 OVERSAMPLING DIGITAL FILTER
LINEAR INTERPOLATION FILTER
OUTPUT CIRCUIT
ΣΔ MODULATOR
※1
R445 R446
R447 R448
PD-T507 SERIES 270 470
PD-T307 SERIES 680 SHORT
L ch
R ch
JA401
LINE OUT
PKB1009
PD-T507 SERIES ONLY
HEADPHONE BOARD ASSEMBLY
IC406
BA15218
JA501
RKN1002
HEADPHONE
Q405
DTC124ES
Q451,452
DTA124ES
Q453,454
2SB1296
DISPLAY ASSEMBLY (PWZ2130:PD-T307 SERIES)
(PWZ2132:PD-T507 SERIES)
V701 PEL1052
COMPU AUTO
AUTO EJECT
PGM
RND
1 ▶ REP
PEAK SCAN
DISC I
DISC II
SW ASSEMBLY
S801 ON/OFF
D801
PD-T507 SERIES ONLY
D701 - D709
1SS254
CN701
REMOTE SENSER
GP1U50X
PD-T507 SERIES ONLY
PD-T307 SERIES ONLY
JA392
PKN1004
OUT
J391
PKN1004
IN
CONTROL
J393
PKN1005
CD DECK SYNCHRO
IC20
M5298P
※2
JP 1 JP 2
PD-T507 SERIES OPEN USED
PD-T307 SERIES USED OPEN
IC21
NJM2930-L05
IC31
ICP-N10
PD-T507/UPW ONLY
CAUTION:FOR CONTINUED PROTECTION AGAINST RISK OF FIRE. REPLACE WITH SAME TYPE NO. ICP-N10, MFD BY ROHM CO. LTD. FOR IC31.
D11-D14
11ES2
PTT1189 (PD-T507/UPW)
PTT1189 (PD-T307/UPW)
POWER TRANSFORMER
※ : PWM1465/UPW ONLY
AC POWER CORD
PDG1006
AC IN
SD TYPE ONLY
PTT1190
POWER TRANSFORMER
PSB1002
VOLTAGE SELECTOR
240V
220V
120-127V
110V
AC POWER CORD
PDG1013
AC110/120-127/220/240V 50/60Hz
PD-T507 SERIES ONLY
CN351
PD-T507 SERIES 31 pin
PD-T307 SERIES 29 pin

PD-T507 SERIES ; PD-T507/UPW and SD
PD-T307 SERIES ; PD-T307/UPW and SD

1. RESISTORS :
Indicated in Ω, 1/6W, ±5% tolerance unless otherwise noted k ; kΩ, M ; MΩ, (F) : ±1%, (G) : ±2%, (K) : ±10%, (M) : ±20% tolerance.

2. CAPACITORS :
Indicated in capacity (μF) /voltage (V) unless otherwise noted p ; pF.
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE CURRENT :
☐ ; DC voltage (V) at play state.
← mA ; DC current at play state.
Value in ( ) is DC current at stop state.

4. OTHERS :
→ : Signal route.
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitor and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES (Underline indicates switch position)
DISPLAY ASSEMBLY (For PD – T507 SERIES)
S701 : STOP
S702 : EJECT
S703 : PAUSE
S704 : DISC I O/C
S705 : DISC II O/C
S706 : SCAN
S707 : RND
S708 : PLAY
S709 : DISC II
S710 : DISC I
S711 : PEAK
S712 : ▶▶
S713 : ◀◀
S714 : REP
S715 : CLEAR
S716 : PGM
S717 : EDIT
S718 : 10
S719 : 9
S720 : 8
S721 : 7
S722 : > 20
S723 : 6
S724 : 5
S725 : 4
S726 : + 10
S727 : 3
S728 : 2
S279 : 1
S730 : ▶▶|
S731 : |◀◀
S732 : TIME

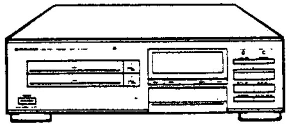
SW ASSEMBLY
S801 : POWER ON – OFF

5. SWITCHES (Underline indicates switch position)
DISPLAY ASSEMBLY (For PD – T307 SERIES)
S701 : STOP
S702 : EJECT
S703 : PAUSE
S704 : DISC I O/C
S705 : DISC II O/C
S706 : SCAN
S707 : RND
S708 : PLAY
S709 : DISC II
S710 : DISC I
S711 : PEAK
S712 : ▶▶
S713 : ◀◀
S714 : REP
S715 : CLEAR
S716 : PGM
S717 : EDIT
S730 : ▶▶|
S731 : |◀◀
S732 : TIME

SW ASSEMBLY
S801 : POWER ON – OFF

PIONEER
The Art of Entertainment

Service Manual



SERVICE GUIDE

ORDER NO.
ARP2144

TWIN–TRAY COMPACT DISC PLAYER

PD-Z74T

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 8E3 Canada
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 9120 Beveren, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911
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SO MAR. 1991 Printed in Japan

DISASSEMBLY AND REASSEMBLY PROCEDURE OF TWIN MECHANISM

1. DISASSEMBLY

1.1 REMOVAL OF TRAY I

(1) Set the tray I to the OPEN position by pressing the OPEN/CLOSE button.

Note: When openning the tray I manually, insert a finger from the groove and rotate the idler gear in clockwise direction, shown in Fig. 1-1.

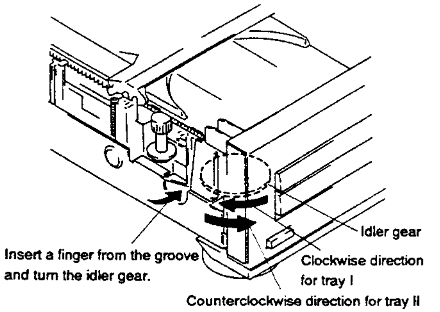

Idler gear
Insert a finger from the groove and turn the idler gear.
Clockwise direction for tray I
Counterclockwise direction for tray II

Fig. 1-1

(2) As shown in Fig. 1-2, insert a screw driver to the left slit of the tray I and pull out the tray in the direction of the arrow B, while the screw driver keeping to press in the direction of the arrow A.

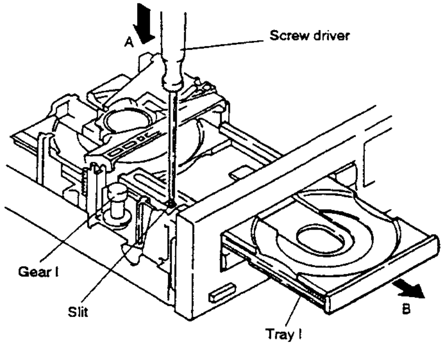

A
Screw driver
Gear I
Slit
B
Tray I

Fig. 1-2

1.2 REMOVAL OF TRAY II

(1) Set the tray II to the OPEN position by pressing the OPEN/CLOSE button.

Note: When openning the tray II manually, rotate the idler gear in the counterclockwise direction, shown in Fig. 1-1.

(2) As shown in Fig. 1-3, insert a screw driver to the right slit of the tray II and pull out the tray in the direction of the arrow B, while the screw driver keeping to press in the direction of the arrow'A.

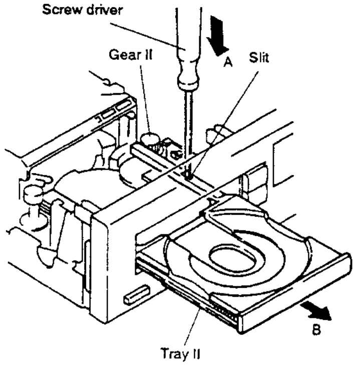

Screw driver
Gear II
A
Slit
B
Tray II

Fig. 1-3

1.3 REMOVAL OF CLAMPER ARM U AND B

(1) As shown in Fig. 1-4, rotate the idler gear so that the clamper assembly not to be clamped on the disc table. Next, take out the clamp sprig and the screw Ⓐ, and remove the clamper arm U and B.

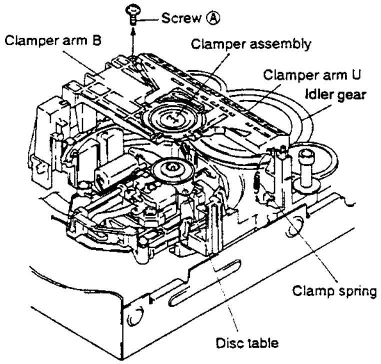

Screw Ⓐ
Clamper arm B
Clamper assembly
Clamper arm U
Idler gear
Clamp spring
Disc table

Fig. 1-4

1.4 REMOVAL OF SERVO MECHANISM ASSEMBLY

(1) Remove the tray I. (Refer to 1.1, REMOVAL OF TRAY I)

(2) Remove the tray II. (Refer to 1.2, REMOVAL OF TRAY II)

(3) Remove the clamper arm U and B. (Refer to 1.3, REMOVAL OF CLAMPER ARM U AND B)

(4) Remove four screws holding the servo mechanism assembly.

Note: As shown in Fig. 1-5, lead wires from the servo mechanism assembly are fixed by two hooks and a binder on the back of the twin tray mechanism section.

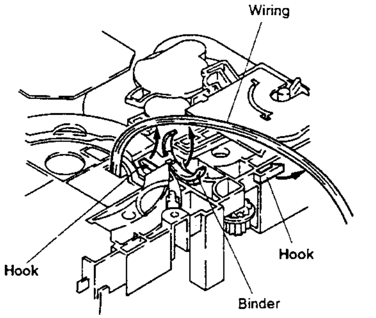

Wiring
Hook
Hook
Binder

Fig. 1-5

1.5 REMOVAL OF LOADING BELT AND LOADING MOTOR

(1) Remove the tray I. (Refer to 1.1, REMOVAL OF TRAY I)

(2) Set the tray II to the OPEN position. (Refer to 1.2, REMOVAL OF TRAY II (1))

(3) Remove the belt and two screws Ⓑ, shown in Fig. 1-6.

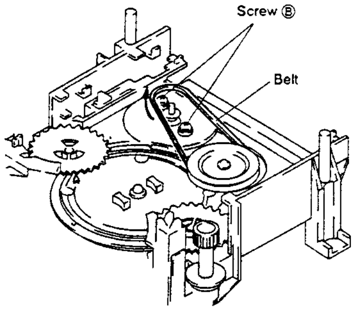


Fig. 1-6

(4) Set the tray II to the Close position.

(5) Remove screws holding the twin tray mechanism, and take out the twin tray mechanism from the body.

(6) Turn over the twin tray mechanism to set the position as shown in Fig. 1-7.

(7) Remove a screw Ⓒ holding the mechanism PCB assembly.

(8) Hold the A section of the mechanism PCB assembly and lift it up to the direction of the arrow, and remove the loading motor accompanied with the mechanism PCB assembly.

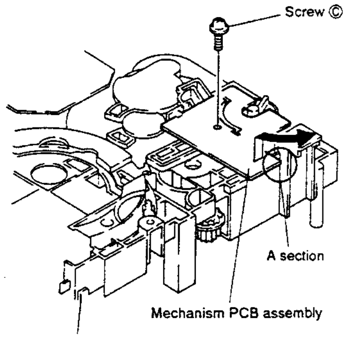

Screw Ⓒ
A section
Mechanism PCB assembly

Fig. 1-7

2. REASSEMBLY

2.1 ASSEMBLY OF CLAMPER CAM AND FLOATING BASE

(1) As shown in Fig. 2–1, adjust the notches (3 points) in the clamper cam to the claws (3 points) of the loading base, and set the clamper cam to the position as the arrow shows.

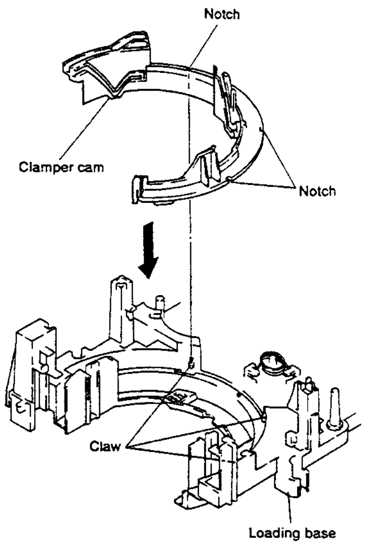

Notch
Clamper cam
Notch
Claw
Loading base

Fig. 2–1

(2) After adjusting the notches in the clamper cam to the claws (3 points) showing in Fig. 2–1, place the protrusions of the floating base on the grooves (2 points) of loading base as the arrow shows in Fig. 2–2.

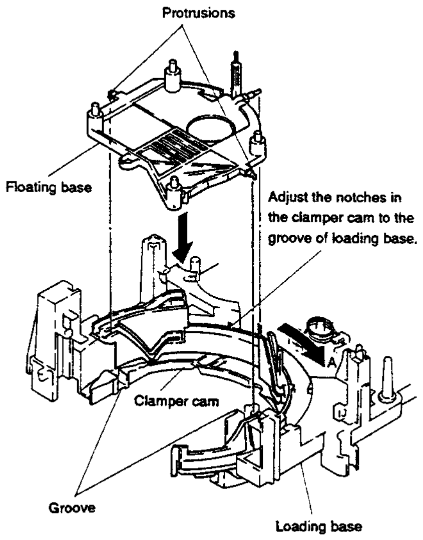

Protrusions
Floating base
Adjust the notches in the clamper cam to the groove of loading base.
A
Clamper cam
Groove
Loading base

Fig. 2–2

(3) Rotate the clamper cam in the direction of the arrow A, and stop the rotation when the floating base reaches to the lowest position.

Note: Keep the floating base to the lowest position till the assembling of the main cam, follow gear, gear I, gear II, clamper arm U and B is completed.

2.2 ASSEMBLY OF MAIN CAM, FOLLOW GEAR, GEAR I, GEAR II AND GEAR PULLEY

(1) As shown in Fig. 2–3, attach the main cam, trying to adjust the main cam hole A to the clamper cam protrusion. Next, hold it with screw Ⓓ.

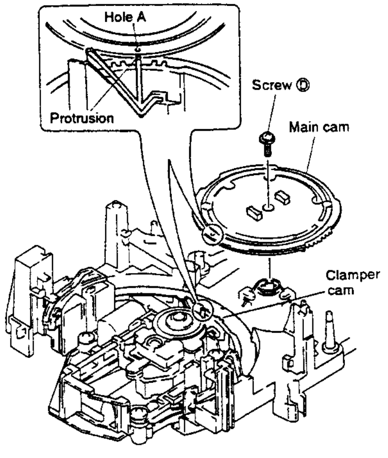

Hole A
Protrusion
Screw Ⓓ
Main cam
Clamper cam

Fig. 2–3

(2) As shown in Fig. 2–4, after adjusting ♡ marks (2 points) on the main cam to the same marks on the two follow gears, insert them into the section A and B respectively.

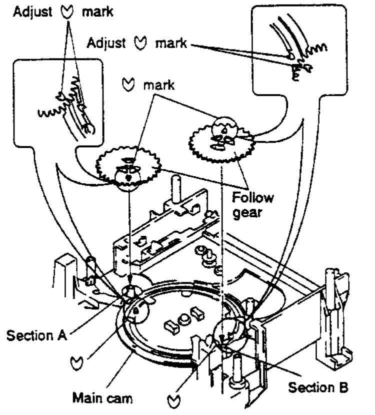

Adjust ♡ mark
Adjust ♡ mark
♡ mark
Follow gear
Section A
♡
Main cam
♡
Section B

Fig. 2–4

(3) As shown in Fig. 2–5, adjust ▯mark on the gear I and the gear II to the hole ▯on follow gears, insert to positions shown in Fig., and hold them with two screws Ⓔ respectively.

(4) Insert the gear pulley to the position shown in Fig., and hold with the screw Ⓕ.

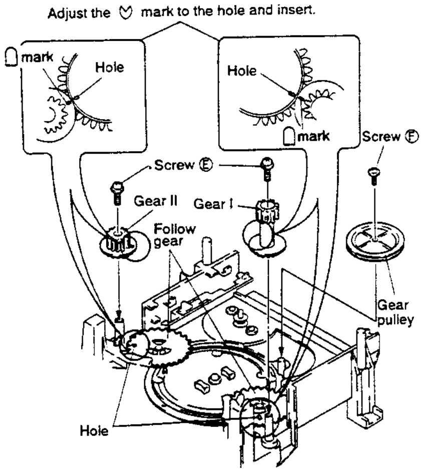

Adjust the ♡ mark to the hole and insert.
▯mark
Hole
Hole
▯mark
Screw Ⓕ
Screw Ⓔ
Gear II
Gear I
Follow gear
Gear pulley
Hole

Fig. 2–5–1

(5) Finally, each gear position should be as follows.

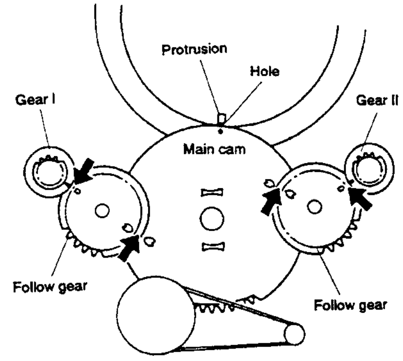

Protrusion
Hole
Gear I
Gear II
Main cam
Follow gear
Follow gear

Fig. 2–5–2

2.3 ASSEMBLY OF CLAMPER ARM B, CLAMPER ARM U AND CLAMPER ASSEMBLY

(1) As shown in Fig. 2-6, insert the protrusion A of the clamper arm B into the groove of the loading base, and insert the protrusion C into the groove on the loading base, while the protrusion B being inserted into the groove on the clamper cam.

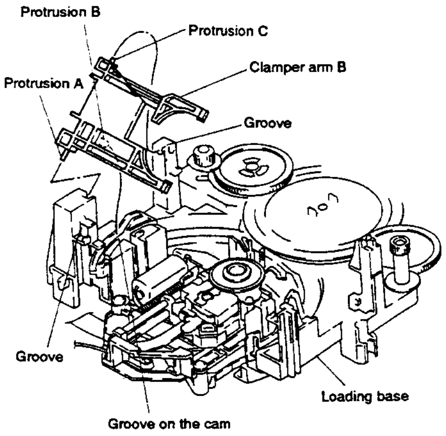
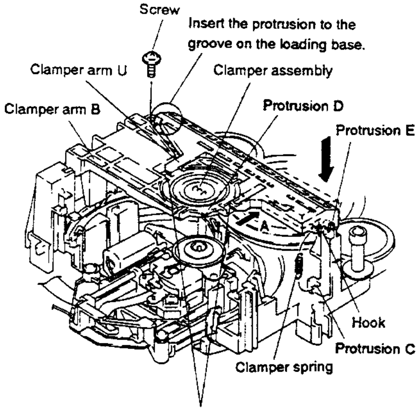

Protrusion B
Protrusion C
Clamper arm B
Protrusion A
Groove
Groove
Loading base
Groove on the cam

Fig. 2-6

(2) As shown in Fig. 2-7, attach the clamper assembly to the clamper arm B so that the protrusion D of the clamper assembly may turn to the position as Fig. shows.


Screw
Insert the protrusion to the groove on the loading base.
Clamper arm U
Clamper assembly
Clamper arm B
Protrusion D
Protrusion E
A
Hook
Protrusion C
Clamper spring

Insert the protrusion of the clamper arm U to the groove on the clamper assembly.

Fig. 2-7

(3) As shown in Fig. 2-7, insert the protrusion of the clamper arm U to the groove on the clamper assembly, and slide in the direction of the arrow A. Next, insert the protrusion of the clamper arm U to the groove on the loading base, while the protrusion E being pushed into the hook of the loading base.

2.4 ASSEMBLY OF LOADING MOTOR

(1) Press down the motor pulley toward the upper surface of the loading motor, keeping the space of 3 mm between the motor pulley and the upper surface of the loading motor.

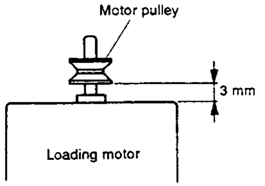

Motor pulley
3 mm
Loading motor

Fig. 2-8

(2) Solder the terminals of the loading motor to the mechanism PCB assembly. Since the loading motor has polarity, the positional relation between the label of the motor and the mechanism PCB assembly is shown in Fig. 2-9.

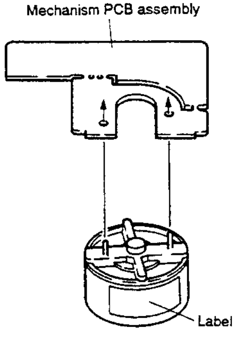

Mechanism PCB assembly
Label

Fig. 2-9

(3) As shown in Fig. 2-10, after turning over the loading base, insert section A into the section B as the arrow shows, and fix with the screw Ⓖ.

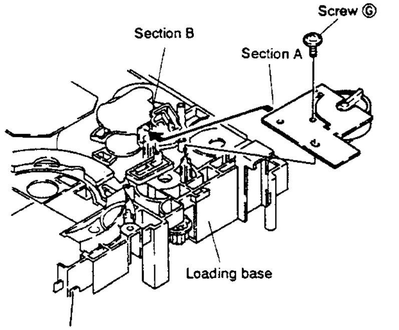

Screw Ⓖ
Section B
Section A
Loading base

Fig. 2-10

(4) Turn over the loading base once again, and tighten the loading motor with two screws Ⓑ and set the belt as shown in Fig. 2-11.

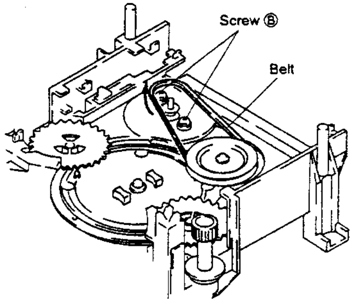


Fig. 2-11

2.5 ASSEMBLY TRAY I AND TRAY II

(1) As shown in Fig. 2-12, attach the lock lever and the lever spring to the sub tray (the two same forms), which must be placed to the left hand of the sub tray, if the sub tray is attached with the tray I, and which must be placed to the right hand of it, if it is attached with the tray II, looking from the front of the sub tray.

Note: Two lock levers are the same forms.

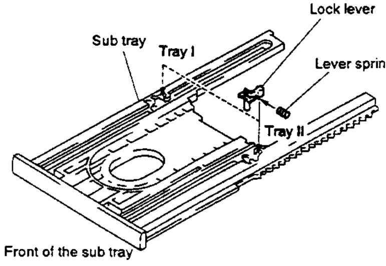

Lock lever
Sub tray
Tray I
Lever spring
Tray II
Front of the sub tray

Fig. 2–12

(2) As shown in Fig. 2–13, attach the tray I or II to the sub tray by the hook applied to the section A. At that time note that the tray I has the gear on the left hand, and the tray II has the gear on the right hand. When attaching respectively, make sure the position where the lock lever attached.

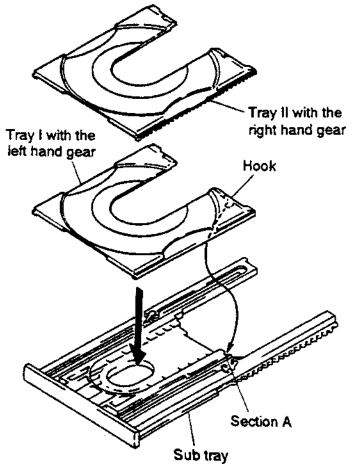

Tray II with the right hand gear
Tray I with the left hand gear
Hook
Section A
Sub tray

Fig. 2–13

(3) As shown in Fig. 2–14, turn over the tray, and put three screws Ⓗ on it.

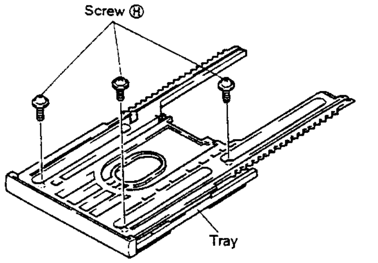


Fig. 2–14

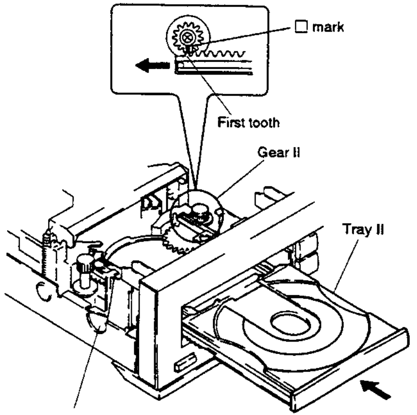
2.6 ATTACHMENT OF TRAY II

(1) Press the OPEN/CLOSE button to make the tray I is in clamp condition, and the tray II is in open condition.

Note 1: When opening the tray II manually, insert a finger into the groove shown in Fig. 2–15, and fully rotate the idler gear counterclockwise. (As for the idler gear, refer to Fig. 1–1)

Note 2: Tray I should be attached after tray II's attachment has been completed.

(2) As shown in Fig. 2–15, adjust the ☐ mark on the gear II to the first tooth of the tray II, then push in the tray II slowly.


☐ mark
First tooth
Gear II
Tray II

Rotate the gear by the finger insert into this groove.

Fig. 2–15

2.7 ATTACHMENT OF TRAY I

(1) Press the OPEN/CLOSE button to make the disc II is in clamp condition, and the tray I is in open condition.

Note: When opening the tray I manually, insert a finger into the groove shown in Fig. 2–15, and rotate the idler gear clockwise, and tray II is clamped.
Further, rotate the idler gear, the pin pressing the switch appears at B position. When the pin moves to A position, stop the gear rotation. The gear I reaches to a position shown in the figure. At this position, attach the tray I.

(2) As shown in Fig. 2–16, adjust the first tooth of the tray I to the clogged part of the gear I, then push in the tray I slowly.

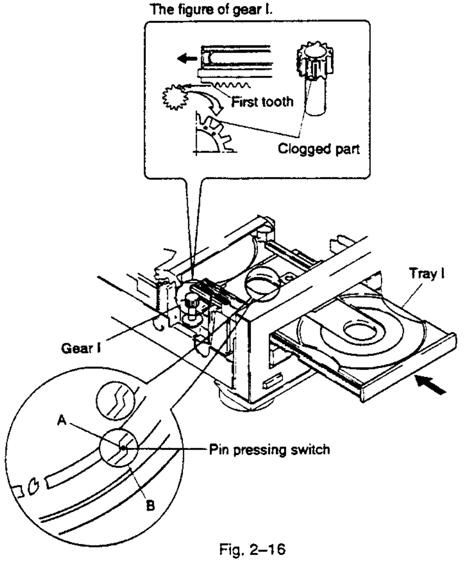

The figure of gear I.
First tooth
Clogged part
Tray I
Gear I
A
Pin pressing switch
B

Fig. 2–16

2.8 STYLING

(1) Bend the wires as shown in Fig. 2–17.

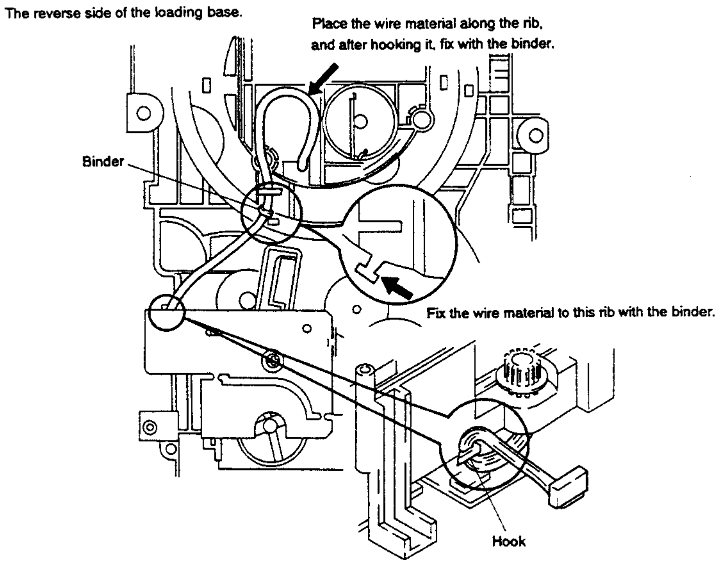

The reverse side of the loading base.
Place the wire material along the rib, and after hooking it, fix with the binder.
Binder
Fix the wire material to this rib with the binder.
Hook

Fig. 2–17

3. OPERATION OUTLINE

3.1 CHARACTERISTICS

The twin–tray mechanism of this unit is characterized by two basic features.

The first one is that both trays are driven by only one loading motor like in conventional single–tray system. This is a continuation of the design thought underlying the last generation twin–tray mechanism.

The second feature is the sandwiched tray design together with the utilization of a vertically moving servo mechanism for clamping, and horizontally arranged parts, resulting in a simplified construction and reducing the depth and width of the mechanism. As a result, the dimensions of the tray mechanism are almost the same size as for conventional single–tray system.

In addition, the mechanism is suited for mini-sized (260 mm width) products.

3.2 STRUCTURE OF THE TRAY SECTION

The tray section consists of a tray and a sub tray, as shown in Fig. 3–1. The tray slides in the sub tray grooves and is secured by three screws.

The switching between tray and sub tray operation is performed via a lock lever mounted on the sub tray.

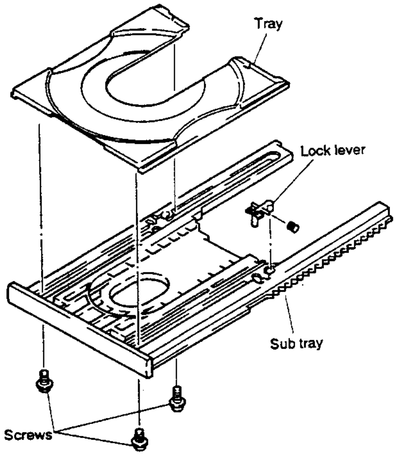

Tray
Lock lever
Sub tray
Screws

Fig. 3–1

As shown in Fig. 3–2, while the tray is opening or closing, the lock lever is held in the guide rib notch portion of the sub tray by the force of the lever spring, so that tray and sub tray move as one unit.

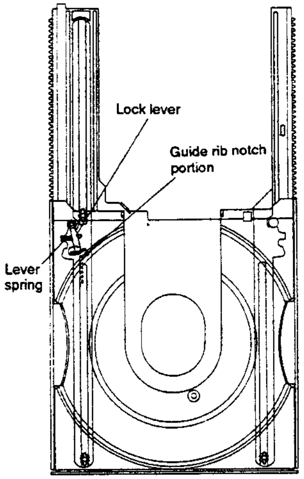

Lock lever
Guide rib notch portion
Lever spring

Fig. 3–2

When the tray is closed, the lock lever is disengaged from the guide rib notch of the sub tray by way of the guide groove in the loading base, and the interlocking between tray and sub tray is released.

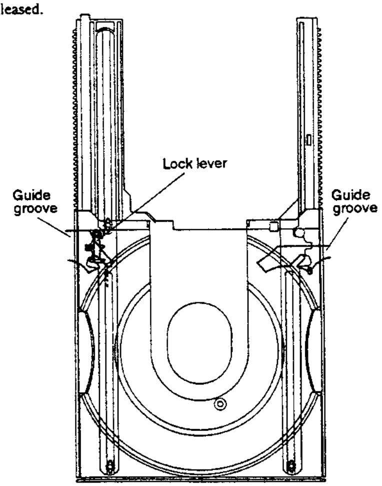

Lock lever
Guide groove
Guide groove

Fig. 3–3

When CHANGE or PLAY button is depressed, only the tray moves on the sub tray, as shown in Fig. 3–4. The driving gear for tray I is located on the left side of the tray and the lock lever is mounted on the left side of the sub tray. The driving gear and the lock lever for tray II are located on the right side.

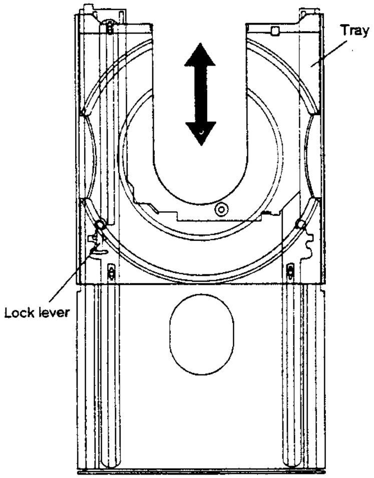

Tray
Lock lever

Fig. 3–4

3.3 POWER TRANSMISSION FROM THE LOADING MOTOR

As shown in Fig. 3–5, the rotation of the loading motor is transmitted to the main gear via a rubber belt, gear pulley, and idler gear.

The follow gears located on both side of the main gear are synchronized with the rotation of the main gear and rotate gear I and gear II respectively. Gears I and II drive the two trays.

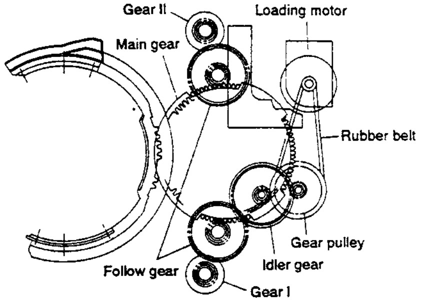

Gear II
Loading motor
Main gear
Rubber belt
Gear pulley
Idler gear
Follow gear
Gear I

Fig. 3–5

As shown in Fig. 3–6, the drive power of the tray is transmitted by gears I and II to the gear section on the side of the sub tray and the tray. When the OPEN button is depressed, only the sub tray side is engaged, changing over to the tray side half–way between tray OPEN position and tray CLOSE position and then driving only the tray side to perform operation switching by the lock lever.

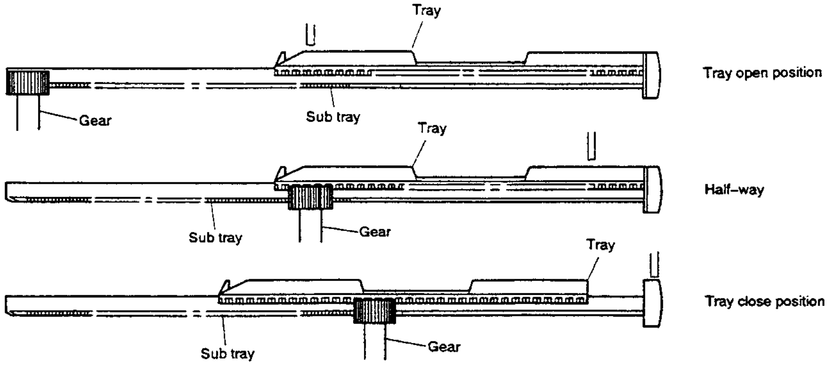

Tray
Gear
Sub tray
Tray open position
Tray
Half–way
Sub tray
Gear
Tray
Tray close position
Sub tray
Gear

Fig. 3–6

The clamp cam, as shown in Fig. 3–7, rotates in synchronization with the main cam rotation to move the float base vertically. The cam groove of the clamp cam drives clamper arm B which, together with clamper arm U and the clamper holder, moves the clamper assembly up and down. (Refer to Fig. 1–4)

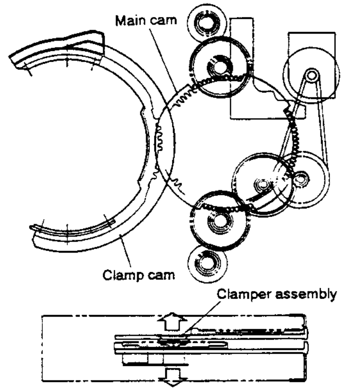

Main cam
Clamp cam
Clamper assembly

Fig. 3–7

3.4 TRAY POSITION DETECTION

The mechanism for tray position detection is shown in Fig. 3–8. The tray position is detected by the tips of three plastic springs, which are located on the loading base to follow the change of diameter in two grooves on the rear side of the main cam, and the ON/OFF condition of three switches located on the mechanism board.

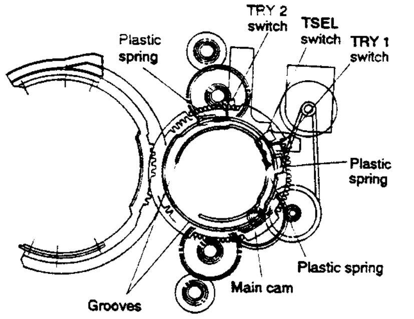

TRY 2 switch
TSEL switch
TRY 1 switch
Plastic spring
Plastic spring
Plastic spring
Grooves
Main cam

Fig. 3–8

3.5 MAIN CAM OPERATION

The main cam performs switching between operations.

(1) OPEN/CLOSE Operation

The two follow gears are located on the left and the right side of the main cam respectively. The left follow gear drives tray I via gear I and the right follow gear drives tray II via gear II.

As shown in Fig. 3–9, when tray I is in OPEN position, the left follow gear is engaged with the main cam gear. The non–toothed sections of the right follow gear and the main cam face each other, and the follow gear does not rotate. Therefore, when the motor rotates to tray I CLOSE direction (main cam rotates counterclockwise), only the left follow gear is driven to tray I to CLOSE direction. At this time, tray II is in the PLAY position.

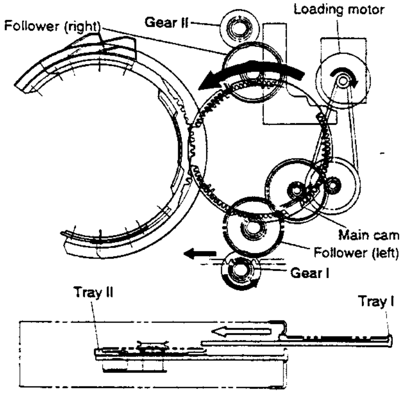

Follower (right)
Gear II
Loading motor
Main cam
Follower (left)
Gear I
Tray II
Tray I

Fig. 3–9

MECHANISM POSITION		TRAY1	TRAY2	TRY1 switch	TSEL switch	TRY2 switch	Remarks
	①	OPEN	PLAY	L	H	L	When tray 2 is in play position, indicates that tray 1 has arrived in open position from close position.
	②	OPEN/ CLOSE	PLAY	H	H	L	When tray 2 is in play position, indicates that tray 1 is between close position and open position.
	③	CLOSE	PLAY	H	L	L	When tray 2 is in play position, indicates that tray 1 is at close position.
	④	CHANGE	CHANGE	H	L	H	When there is transition from ④ to ⑤, indicates that there is movement in progress with tray 1 to play position and tray 2 to close position.
	⑤	CHANGE	CHANGE	H	H	H	When there is transition from ⑤ to ④, indicates that there is movement in progress with tray 1 to close position and tray 2 to play position.
	⑥	PLAY	CLOSE	L	H	H	Indicates that tray 1 is in play position and tray 2 in close position.
	⑦	PLAY	OPEN/ CLOSE	L	L	H	When tray 1 is in play position, indicates that tray 2 is between close position and open position.
	⑧	PLAY	OPEN	L	L	L	When tray 1 is in play position, indicates that tray 2 has arrived in open position.

As shown in Fig. 3–10, when tray I is in CLOSE position, the non–toothed sections of the main cam and the left follow gear face each other, so that the follow gear does not rotate. At this time, the right follow gear is still positioned at the non–toothed section of the main cam so that tray II remains in PLAY position. OPEN/CLOSE operation of tray II is performed by reversing the above operation.

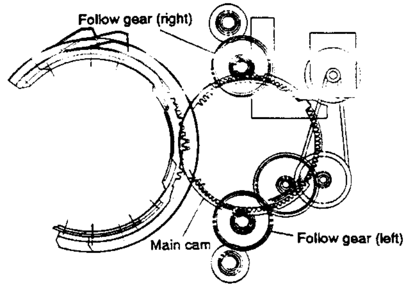

Follow gear (right)
Main cam
Follow gear (left)

Fig. 3–10

(2) DISC Change Operation

As shown in Fig. 3–11, when tray I is in CLOSE position and tray II is in PLAY position, the follow gears (right and left) do not rotate as described above. At this time, the single tooth of the main cam and the 2–tooth of the clamp cam will be engaged and the clamp cam starts to rotate.

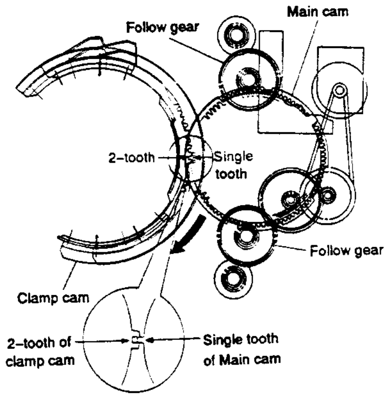

Follow gear
Main cam
2–tooth
Single tooth
Follow gear
Clamp cam
2–tooth of clamp cam
Single tooth of Main cam

Fig. 3–11

When the main cam rotates counterclockwise as shown in Fig. 3–12, the clamp cam also rotates synchronously. The float base supported by the loading base guide moves down along the three V–shaped cams of the clamp cam. At the same time, the clamper arm moves along the groove on the right side of the clamp cam to raise the clamper assembly. By this operation the DISC clamp is released.

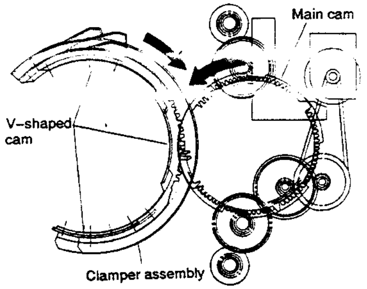

Main cam
V–shaped cam
Clamper assembly

Fig. 3–12

When the main cam rotates further as shown in Fig. 3–13, the float base moves to the valley of the V–shaped cam and the gear section of the main cam and the follow gears are engaged. The follow gears (right and left) simultaneously rotate in clockwise direction. Driven by the follow gears, gears I and II rotate and simultaneously move tray I from the CLOSE position to the PLAY position and tray II from the PLAY position to the CLOSE position.

By this operation the DISC is changed. At this time, the non–toothed sections of the clamp cam and the main cam face each other so that the cams do not rotate.

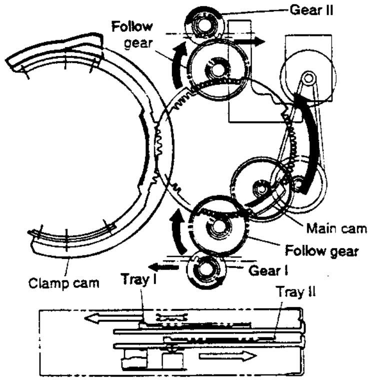

Gear II
Follow gear
Main cam
Follow gear
Gear I
Clamp cam
Tray I
Tray II

Fig. 3–13

As shown in Fig. 3–14, the second level gear of the main cam and the clamp cam gear engage just before the movements of tray I and tray II are completed, and the clamp cam starts to rotate again. The right and left follow gears face the non–toothed sections of the main cam, and at the same time the rotation stops.

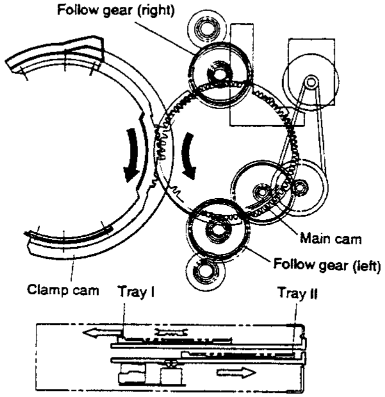

Follow gear (right)
Main cam
Follow gear (left)
Clamp cam
Tray I
Tray II

Fig. 3–14